3140 Finley Road Downers Grove, IL 60515 (630) 795-3200 Fax (630) 795-1130



### **MEMORANDUM**

To:

Frank LaPointe, Clark Refining & Marketing

John Berghoff, Mayer Brown & Platt

From:

Monte Nienkerk Mmn

Subject:

DATA GENERATED DURING A SOIL INVESTIGATION BETWEEN

AUGUST 18, 1999 AND AUGUST 25, 1999 AT THE CLARK OIL

COMPANY'S BLUE ISLAND REFINERY

Date:

October 12, 1999

Clayton completed a review of a summary table (provided by Clark) that describes past spills and releases at the Clark facility. In addition, Clayton personnel met with personnel from Clark's Environmental Department to tour the facility and to obtain additional information concerning past spills. Table 1 describes those spills or releases (from the Clark summary table) that could have potentially impacted soil. This table also cross-references the spill/release summary table previously supplied to the regulatory authorities. These past spills or releases are shown on Figure 1.

Two items (7 and 10) were not considered since the releases did not contain hydrocarbons. Items 16 and 25 were not considered since: either the location of the release is not known (item 25), or it is not known if there was a release or its location (item 16). Item 23 is not proposed for investigation since the release was small (75 gallons), and the area is unknown.

The locations of the proposed 10 free-phase hydrocarbon recovery wells are shown on Figure 1. A review of the proposed locations of these wells shows that five of the wells are positioned in the area of known past releases. These include the following:

- One proposed well in the Main Refinery west of Tank 37. This is in the area of Table 1, Item Number 1.
- One proposed well in Southwest Property Tank Farm near Tank 47. This is in the area of Table 1, Item Numbers 6 and 12.
- One proposed well in the Southwest Property Tank Farm near Tank 55. This is in

Soil Investigation Data Clark Oil Refinery / Blue Island, Illinois 15-99036.10ma002.doc\10/12/99 \ MMN\BRS



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the area of Table 1, Item Number 19.

• Two proposed wells in the Northwest Property Tank Farm – one near Tank 801 and one near Tank 807. These two wells are in the area of Table 1, Item Numbers 3, 9, and 15.

The locations of the remaining proposed recovery wells do not directly correlate with a past spill location. Those past spill locations that do not appear to correlate with the proposed recovery well locations include: Table 1, Item Number 2 in the Main Refinery; Table 1, Items Number 4, 5, and 14 near the marine dock in the Southwest Property Tank Farm; Table 1, Item Number 8 at Tank 804 in the Northwest Property Tank Farm; and Table 1, Items Number 11, 13, 17, 18, 20, 21, 22 and 24 located in the north half of the Southwest Property Tank Farm. Items 11, 13, and 22 in Table 1 are assumed to be in the Southwest Property Tank Farm since the releases were benzene, and benzene is stored only in this area.

After review, Clayton identified four areas (labeled A, B, C, and D on Figure 1) for further investigation. Included on Figure 1 are the locations of the soil borings completed by Clayton to investigate these areas.

## Area A - Main Refinery

This area was investigated to assess the past release identified as Table 1, Item Number 2; to further investigate the extent of the release identified as Table 1, Item Number 1; and to evaluate the subsurface conditions between Tanks 37 and 38. Clayton completed soil borings at three locations in this area. CSB-01 is located east of the containment dike around Tank 36; CSB-02 is located between Tanks 37 and 38; and CSB-03 is located just north of the containment dike around Tank 35.

# <u>Area B – Southwest Property Tank Farm between Marine Dock and Tanks 51 and 52</u>

This area was investigated to determine if any free-phase hydrocarbons have migrated beyond the proposed location of the recovery well located at the southeast corner of Tank 52 and to assess the past releases identified as Table 1, Items Number 4, 5, and 14. Clayton completed soil borings CSB-04 and CSB-05 in this area.



#### **MEMORANDUM**

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# <u>Area C – Southwest Property Tank Farm along Road on North Side of Tanks 53</u> and 54

This area was investigated to assess the past releases identified as Table 1, Items Number 11, 13, 17, 18, 20, 21, 22, and 24. The investigation further assesses the impact from release Table 1, Item Number 12. Clayton completed five soil borings (CSB-07 through CSB-11) in this area.

## Area D - Northwest Property Tank Farm in the Area of Tank 804

This area was investigated to assess the past release identified as Table 1, Item Number 8. Clayton completed soil boring CSB-06 in this area.

A final soil boring (CSB-12) was completed in the area of Tank 56 to investigate if any free phase hydrocarbons have migrated beyond the proposed location of the recovery wells located near Tanks 55 and 401.

Clayton used its hydraulic probe unit (HPU – direct push method) to complete the 12 soil borings identified above. These soil borings were completed to depths ranging from 15 to 28 feet below ground surface (bgs). The soils where classified by Clayton geologists and visually inspected for the presence of free phase hydrocarbons. A photoionization detector (PID) with a 10.2 ev lamp was used to perform a headspace screening of the soil samples for the presence of hydrocarbons. The boreholes were backfilled with bentonite chips.

Soil boring logs for the 12 completed soil borings are attached. A review of these logs shows that the soils beneath the Clark facility generally consist of lacustrine silts and sands that overlie a zone of peat and clay containing shells. The lacustrine deposits overlie a glacial till. The lacustrine silts and sands vary in thickness from less than 9 feet thick to greater than 15 feet thick. The peat and clay zone varies in thickness from less than 0.5 feet thick to approximately 1.5 feet thick. All of the soil borings terminated in the glacial till. Therefore, the total thickness of the glacial till unit was not determined. However, at soil boring CSB-12, refusal was encountered at 28.5 feet bgs. This may represent the bedrock surface or weathered bedrock surface in this area.

Visible signs of free phase hydrocarbons were noted in soil borings completed at CSB-01 and CSB-10. At CSB-01, free phase hydrocarbons were encountered at approximately 4 feet bgs and at approximately 12 feet bgs. At CSB-10, free phase hydrocarbons were encountered at 5 feet bgs.



#### MEMORANDUM

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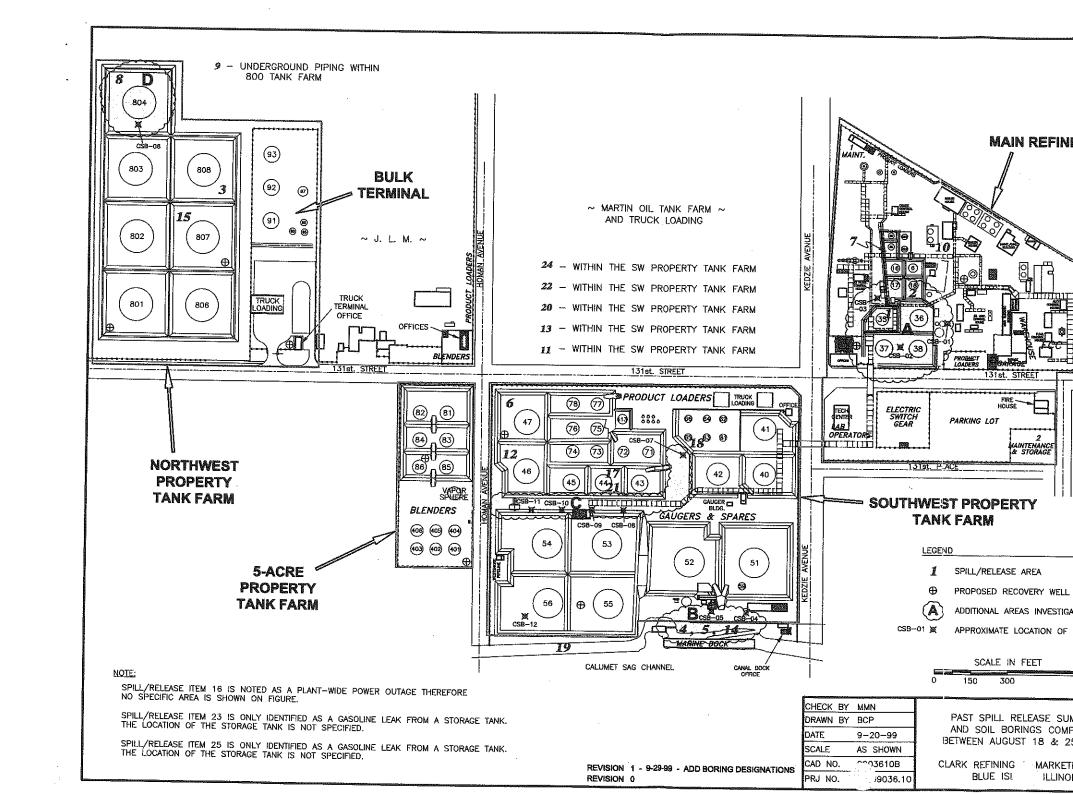
Table 2 provides the results of the PID headspace screening of the soil samples. The PID readings are also recorded on the soil boring logs. Elevated PID readings were reported for soil samples collected from CSB-01, CSB-03, CSB-04, CSB-05, CSB-10, and CSB-11. At CSB-03, the only saturated soil that was encountered occurred within a thin, fine gravel lens at a depth of 9.1 to 9.3 feet bgs. The highest PID reading measured at CSB-03 was from a soil sample collected at a depth interval of 4 to 6 feet bgs. Because no PID reading exceeded 50 at a depth greater than 9 feet, installation of a recovery system at this location does not seem appropriate.

Based on the above information, the following recommendations are made.

- 1. An additional free phase hydrocarbon recovery well should be located at soil boring CSB-01. This is in the main refinery area (Area A), east of the containment dike around Tank 36. Visible signs of free phase hydrocarbons and elevated PID readings were observed at this location.
- 2. A free phase hydrocarbon recovery trench should be located in the area of soil borings CSB-04 and CSB-05. This is in the Southwest Property Tank Farm between the marine dock and Tanks 51 and 52 (Area B). No visible signs of free phase hydrocarbons were observed in this area; however, elevated PID readings were recorded in the saturated zone at both of these soil borings. These elevated PID readings indicate the possible presence of free phase hydrocarbons. The proposed recovery trench should be installed instead of the proposed recovery well at this location.
- 3. A free phase hydrocarbon recovery trench should be located in the area of soil borings CSB-10 and CSB-11. This is in the Southwest Property Tank Farm north of Tank 54 (Area C). Visible signs of free phase hydrocarbons were observed at CSB-10. Even though no visible signs of free phase hydrocarbons were observed at CSB-11, elevated PID readings (indicating the possible presence of free phase hydrocarbons) were recorded in the saturated zone of this soil boring. The proposed recovery trench should be installed instead of the proposed recovery well at the Tank 47 location.



# **FIGURE**





# **TABLES**

TABLE 1 Past Spill Release Summary to Land/Groundwater

Clark Refining & Marketing, Inc. / Blue Island, Illinois

									ĺ
Area C investigation		Tank 44 dike	500 gallons	Petroleum naphtha	950278	279187	February 9, 1995	39	-11
Not applicable - nondescript		Plant-wide power outage	Unknown	Gasoline component	None	None	March 9, 1995	40	9
Recovery Well at Tank 807	Liquid material was recovered by vactruck and palced in refinery recycle system. Contaminated soil was disposed.	24" underground pipe leak 807 tank dike	500 gallons	Gasoline	950641	285161	March 31, 1995	45	£
Area B investigation	Contaminated soil was excavated and sent for disposal	Canal dock	Unknown	genzene Benzene	951005	291030	May 11, 1995	47	14
Area C investigation		Southwest Tank Farm	15 gallons	Вепzепе	None	312371	October 29, 1995	5	5
Area C investigation - recovery well at Tank 47	Contaminated soil was excavated and sent for disposal	Tank 46 dike	20,000 barrels	Benzene	960408	330763	March 12, 1996	53	12
Area C investigation	Contaminated soil was excavated and sent for disposal	Southwest Tank Farm	36 pounds	Benzene	960563	335275	April 8, 1996	54	11
Not Applicable - Acid		Platformer cooling tower	200 gallons	Sulfuric acid	None	None	August 26, 1996	55	10
Recovery Wells at Lank 601 and 807		Underground piping	200,000 gallons	Gasoline	970624	383433	April 12, 1997	69/09	6
Area D Investigation	All liquid material recovered by vac truck and placed into refinery recycle system.	Crude oil tank 804	60,000 gallons	Crude oil (42 pounds benzene)	971745	404040	September 17, 1997	89	φ
Not Applicable - Caustic Solution	All liquid material recovered by vac truck and shipped off-site for disoposal.	Released from AST #28. Spilled from dike.	42,000 gallons	Caustic solution (sodium hydroxide and sodium hydrosulfide)	971902	406541	October 7, 1997	7	
Recovery Well at Tank 47	All liquid material recovered by vac truck and placed into refinery recycle system.	AST #47 fallure	56,000 barrels	Gasoline	972107	409925	November 2, 1997	8	ဖ
Area B investigation		2-inch recycle line on a waste water treatment system	7,500 gallons	Wastewater (benzene)	972375	415503	December 12, 1997	18	3
Area B investigation	Material recovered by vac truck and placed in Refinery Recycle system. Rock and soil removed and disposed.	Gas oil spill at dock	100 gallons	Gas Oil	980738	None	April 5, 1998	. 82	4
Recovery Well at Tank 807	All liquid material recovered by vac truck and placed into refinery recycle system.	. Tank 808 dike - drain nipple broke off	10,000 gallons	:Gasoline	983075	None	December 15, 1998	48	က
Area A investigation - Recovery Well west of Tank 37	All liquid material recovered by vacturek and placed into refinery recycle system.	Tank 18 line leak	260 gallons	Naphtha	983167	None	December 28, 1998	85	8
Area A investigation - Recovery Well west of Tank 37	All liquid material recovered by vac truck and placed into refinery recycle system.	Tank 35 relief valve broken	2,000 gallons	Diesel	983185	None	December 30, 1998	86	-
Addressed By	Response	Location	Quantity	Material	I I I I I I I I I I I I I I I I I I I	ING. Reported	Spill Date	onn.	Clayton #

TABLE 1
Past Spill Release Summary to Land/Groundwater

Clark Refining & Marketing, Inc. / Blue Island, Illinois

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Area C investigation	Farm	Unknown	Benzene	None	139647	December 20, 1992	ო	54
•	Underground pipeline/SW Tank			L				
Unknown area		75 gallons	Gasoline	933266	213709	December 22, 1993	60	23
	Storage tank							
Area C investigation	line. S	20 gallons	Benzene	941153	None	May 12, 1994	17	22
	underground 4" benzene transfer					-		
	Released from pinhole leak in an							
Area C investigation	Tank 44	300 gallons	Petroleum naphtha	941715	240712	May 23, 1994	19	z
Area C investigation	(underground pipe leak)	200 gallons	Benzene	941779	254360	August 9, 1994	27	20
	Southwest Tank Farm				ĺ	2		2
Recovery Well at Tank 55	(from 6" line to Channel)	250 gallons	Gasoline	942481	256968	August 23, 1994	- G	6
	Tonk form				1	November 3, 1884	လ	18
Area C investigation	Tank 65 dike	10 barrels	First oil and pasoline	GENEUE	200476	7007	r	
Response	Location	Quantity	Material	Incidente	NRC Report	Spill Date	## # #	elsyron

TABLE 2
Photoionization Detector - Soil Headspace Readings from Soil Borings
Completed between August 18, 1999 and August 25, 1999

Clark Refinery and Marketing, Inc. / Blue Island, Illinois

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		Apparer			•			ains			Ε	to		ļ	М		0	2.1
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10.0	10.8	PEAT (F	PT) -	Black	k, satu	rated				PΤ		10	2		s			
	7-2							and the state of t	*		F	to					0	2.3
10.8	15.0	CLAY (	CL) -	Gray	browr	n, mois	t, soft	, w/ she	ells from	ľ			2		М			
		10.8-12.	.0 fee	et.								12	<u> </u>		<u> </u>		 	
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		Silty Cla	ву (С	L) - D	ark gra	ay, mo	ist, tra	ice fine	-coarse				2					_
		Sand ar	nd Gr	ravel.		77 comments   12 miles						14	<u></u>	]				

Boring / V	Vell No.:	CSB-02	Start Date & Time:	8/18/1999	1427		Finish	Date &	Time :	Allenia per protection and pro-	8/18/19	99 15	15	
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Тар	Bottom		DESCRIPTION	ţ		GRAPHICS	.g.i	Interval	Recovery	Method	Moisture	Blow Count	PID o Measuremer Scan	r FID ts / Remarks Headspace
10.8	150	CLAY (CL) - conti	nued		enderstander (geschichte der eine eine eine eine eine eine eine ei			14					**************************************	
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2.2 FILL - Sand, Gravel, and Clay, dark gray to black, dry.  I to 2 2 D D 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
Project Name:	Remarks
Project Location: Blue Island, II.  Chilling Co.: Clayton Env. Drilling Equipment: Hydraulic probe unit  Chilling Co.: Clayton Env. Drilling Method: Direct push  Chilling Co.: Clayton Env. Drilling Method: Direct push  Cround Elevation: NA Top of Casing Elevation: NA  Borshole Dia: 2* Development Method: NA  Chuter Casing Cia / Material / Length: NA  Chuter Casing Cia / Material / Length: NA  Screen Interval / Material / Stot size: NA  Frax Wolster S.1 Static Welter: S.1  Time: Static Welter: S.1  DESTRIPTION  DESCRIPTION  DESCRIPTI	Remarks
Delling Co.: Clayton Env. Dniling Equipment: Hydraulic probe unit  Oriller: N. Bolivar Onling Method: Direct push  Ground Elevation: NA   Top of Casing Elevation: NA    Borahole Dia: 2"   Development Method: NA    Outer Casing Dia / Malarial / Length: NA    Screen Interval / Material / Length: NA    First Walter: 9.1   Static Water: NA    Date: 8/18/99   Date:    Time (trs):   Time (trs):   Time:   Surface Conditions: Gravel (C8) stained black  DEPTHS   DESCRIPTION   Surface Conditions: Gravel (C8) stained black  DE	Remarks
Driller: N. Bolivar Drillog Method: Direct push Ground Elevation: NA Top of Casing Elevation: NA Boreholde Dia: 2* Development Method: NA Cuter Casing Dia / Material / Length: NA Cuter Casing Dia / Material / Length: NA Coren Interval / Material / Length: NA Coren Interval / Material / Sort size: NA  First Water: 9.1 Static Water:  Date: 8/18/99 Date: Time (trs): Time: Surface Conditions: Gravel (C8) stained black  Trop Bottom  DESCRIPTION  DE	Remarks
Ground Elevation: NA   Top of Casing Elevation: NA   Boreholo Dia: 2*   Development Method: NA   Outer Casing Dia: / Material / Length: NA   Inner Casing Dia: / Material / Length: NA   Screen Interval / Material / Length: NA   Screen Interval / Material / Length: NA   Screen Interval / Material / Stot size: NA   Static Water: Date: 8/18/99   Date:   Surface Conditions: Grawki (C8) stained black    DEPTHS   DEPTHS   DESCRIPTION   Static Water   DESCRIPTION   Screen Interval / Material / Length: NA   Surface Conditions: Grawki (C8) stained black   DESCRIPTION   Screen Interval / Material / Length: NA   Surface Conditions: Grawki (C8) stained black   DESCRIPTION   Screen Interval / Material / Length: NA   Surface Conditions: Grawki (C8) stained black   DESCRIPTION   Screen Interval / Material / Length: NA   Surface Conditions: Grawki (C8) stained black   DESCRIPTION   Screen Interval / Material / Length: NA   Surface Conditions: Grawki (C8) stained black   DESCRIPTION   DESCRIPTION   Surface Conditions: Grawki (C8) stained black   DESCRIPTION   DESCRIPTION   Surface Conditions: Grawki (C8) stained black   DESCRIPTION	Remarks
Borehole Dia: 2* Development Method: NA Outer Casing Dia / Material / Length: NA Inner Casing Dia, / Material / Length: NA Screen Interval / Material / Static Water: Date: 8/18/99 Date:  Time (hrs): Time: Surface Conditions: Gravel (C6) stained black  DESCRIPTION	Remarks
Outer Casing Dia / Malarial / Length:  NA  Screen Interval / Material / Slot size:  NA  Screen Interval / Material / Slot size:  NA  Surface Conditions: Gravel (C5) stained black.  Time (turs):  Top Bottom  DESCRIPTION  DESCRI	Remarks
Inner Casing Dia. / Material / Length:  NA  Screen Interval / Material / Slot size:  NA  First Water: 9.1  DEPTHS  Top Bottom  DESCRIPTION  DESCRIPT	Remarks
Static Water   Material / Stot size:   NA   Static Water:   Date: Static Water:   Static Wat	Remarks
Date: 8/18/19   Date:     Date:       Date:	Remarks
Date: #18/79   Date:   Time (hrs):   Time:   Surface Conditions: Gravel (C8) stained black	Remarks
Time (tris): Time: Surface Conditions: Gravel (C8) stained black    DEPTHS   Top   Bottom   DESCRIPTION   DESCRIPT	Remarks
DEPTHS  Top Bottom  DESCRIPTION   Remarks	
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DESCRIPTION   Section   DESCRIPTION   DESCRIPT	Remarks
O 2.2 FILL - Sand, Gravel, and Clay, dark gray to black, dry.  I A to D D O D O D D O D D D D D D D D D D D	
2.2 10.4 SILTY CLAY (Ct.) - Dark gray w/ black oil-like staining, moist, soft, trace fine-coarse Sand.  Grades gray and harder at 3.9 feet.  Orange mottles visible at 6.0 feet.  I A to 2 2	25
2.2 10.4 SILTY CLAY (CL) - Dark gray w/ black oil-like staining, moist, soft, trace fine-coarse Sand.  Grades gray and harder at 3.9 feet.  Orange mottles visible at 6.0 feet.	25
2.2 10.4 SILTY CLAY (CL) - Dark gray w/ black oil-like staining, moist, soft, trace fine-coarse Sand.  Grades gray and harder at 3.9 feet.  Crance mottles visible at 6.0 feet.  L 2 2 2	25
2.2 10.4 SILTY CLAY (CL) - Dark gray w/ black oil-like staining, moist, soft, trace fine-coarse Sand.  Grades gray and harder at 3.9 feet.  Crasse mottles visible at 6.0 feet.  L 2 2	
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moist, soft, trace fine-coarse Sand.  Grades gray and harder at 3.9 feet.  Grance mottles visible at 6.0 feet.  B to 2	
Grades gray and harder at 3.9 feet.  Grance mottles visible at 6.0 feet  Grance mottles visible at 6.0 feet	
Grades gray and harder at 3.9 feet.  4 2	121
Crange mottles visible at 6.0 feet	
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Orange mottles visible at 6.0 feet	
Orange mottles visible at 6.0 feet	240
Oranga mottles visible at 6.0 feet	
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8 2 M	
	4.4
Fine Gravel lens - Saturated from 9.1-9.3 feet.	44
10 2 M	
Oraces derivigity, sorior wild accorded at 10 local	
10.4 11.9 PEAT (PT) - Dark brown, moist	14
	177
	177
11.9 20.0 CLAY (CL) - Gray brown, moist, soft w/ shells.	1. T
CL G to M — —	£*₹
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Boring / V	Vall No.:	CSB-03 Start Date & Time: 8/18/1999 1555	AT LANGUE AND	Finist	n Date 8	L Time ;	ZZZĄSA (A KAZIĘCZZ	0/18/19	99 17	40	the principle of part of the p
Project N		Clark Refining & Mkt., Inc. Project No.: 15-99036.10-001		Logg	ed By:	K, Com	na in a final facility of a summer		And the last of Annual		
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Тор	Bottom	DESCRIPTION	GRAPHICS	.D.	interval	Recovery	Method	Moisture	Blow Count	PID o Measuremer Scan	r FID nts / Remarks
11.9	20 0	CLAY (CL) - continued		<u> </u>	14			æ	Ш	ocan	Headspace
11.3	20.0	CLAT (CL) - Communica				2					
		Grades to Silty Clay (CL) - Dark gray, moist, harder w/		Н	to			М	brown to	- 1	5.5
		trace fine-coarse Sand at 14.8 feet.			16	2					
1		uace mie-coarse dand at 14.0 reet.			16						
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Barring Mark No. CSBA4 Stand to & Times Optimized Get Stand Color & Times	
Project Location: Blue Istand, IL Orilling Co.: Clayton Env. Orilling Equipment Hydraulic probe unit Orilling: N. Bollvar Orilling Method: Direct push Ground Elevation: NA Top of Casing Elevation: NA Outer Casing Dia: 2* Development Method: NA Outer Casing Dia / Material / Langth: NA Outer Casing Dia / Material / Sist size: NA Pinst Water: State Water: NA  DESCRIPTION  DEPTHS  Top Bottom  DESCRIPTION  DESCRIPTION  DESCRIPTION  ASPH  Top Grades gray brown at 3.7 feet.  CL-ML  Grades gray brown at 3.7 feet.  CL-ML  Grades gray brown at 3.7 feet.  Grades gray w/ orange mottles and black staining  ot 8.8 foots  Grades gray w/ orange mottles and black staining  ot 8.8 foots  Grades gray w/ orange mottles and black staining  ot 8.8 foots  Post push or stain in the push of the push	
Project Location:   Stub Istand, IL   Oriting Co.: Clayton Env.   Oriting Equipment   Hydraulic probe unit	A
Onling Co:   Clayton Erv.   Delling Equipment   Hydraulic probe unit	į N
Driller: N. Bolivar Drilling Method: Drived push Ground Elevation: NA   Top of Casing Blavation: NA   Top of Casing Blavation: NA   Development Method: NA   Development Me	
Cround Elevation: NA	
Borehole Dia: 2"   Development Method: NA	
Outer Casing Dia / Material / Length: NA	
Inner Casing Dia. / Material / Longht: NA   Screen Interval / Material / Slot size: NA	
Screen Interval / Material / Slot size:   State Websr:	
State   Stat	
Date: 8119/99   Date:   Time:   Surface Conditions: Asphalt	
Times (trias)	
DEPTHS   DESCRIPTION   DESCR	101-72-107-10-10-10-10-10-10-10-10-10-10-10-10-10-
DESCRIPTION   Standard   DESCRIPTION   Standard   DESCRIPTION   DESCRI	Winshield Character
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0 0.3 ASPHALT 0.3 0.7 FILL - Sand and Gravel.  0.7 6.6 CLAYEY SILT (CL-ML) - Gray w/ black staining, moist.  Grades gray brown at 3.7 feet.  CL-ML  Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6.6 15.0* SILTY CLAY (CL) - Black, moist, trace roots.  Grades gray w/ orange mottles and black staining  o 1 1 0 1 1 0 1 1 0 1 1 1 0 1 1 1 1 1 1	ts / Remarks
0.3	Headspace
O.7 6.6 CLAYEY SILT (CL-ML) - Gray w/ black staining, moist.  Grades gray brown at 3.7 feet.  CL-ML  Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Grades gray w/ orange mottles and black staining at 8.0 feet.  Grades gray w/ orange mottles and black staining at 8.0 feet.	
Grades gray brown at 3.7 feet.  CL-ML  Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6.6 15.0* SILTY CLAY (CL) - Black, moist, trace roots.  Grades gray w/ orange mottles and black staining	7.5
Grades gray brown at 3.7 feet.  CL-ML  Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6.6 15.0* SILTY CLAY (CL) - Black, moist, trace roots.  Grades gray w/ orange mottles and black staining at 8.0 feet.	
Grades gray brown at 3.7 feet.  CL-ML  B to 2  M 0  CL-ML  4 2  C to 2  M 0  Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6 2  M 0  C to 2  M 0  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  C to 2  M 0  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Grades gray w/ orange mottles and black staining  Grades gray w/ orange mottles and black staining  Grades gray w/ orange mottles and black staining	
Grades gray brown at 3.7 feet.  CL-ML  B to 2 M 0  CL-ML  A 2 C to M 0  Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6.6 15.0* SILTY CLAY (CL) - Black, moist, trace roots.  Grades gray w/ orange mottles and black staining  St 8.0 feet.  8	
Grades gray brown at 3.7 feet.  CL-ML  4 2	6.5
Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6 2 M  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6 2 M  Grades gray w/ orange mottles and black staining  St. 8.0 foot	0.5
Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Clay lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Clay lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.	
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Silty Clay lens - Gray from 5.2-5.5 feet.  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6 2 M  Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  5 2 M  S 0  A 2 M  Grades gray w/ orange mottles and black staining	
Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6 2 M  5 15.0* SILTY CLAY (CL) - Black, moist, trace roots.  Grades gray w/ orange mottles and black staining  6 2 M  5 0  M  6 2 M  8 2 M  8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	10.9
Silty Sand lens - Gray, saturated from 6.4-6.6 feet.  6.6 15.0* SILTY CLAY (CL) - Black, moist, trace roots.  Grades gray w/ orange mottles and black staining	
6.6 15.0* SILTY CLAY (CL) - Black, moist, trace roots.    D   to   Z   S   D   M   D   SILTY CLAY (CL) - Black, moist, trace roots.	
Grades gray w/ orange mottles and black staining	'
Grades gray w/ orange mottles and black staining	52
Grades gray w/ orange mottles and black staining	
8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8	
at 8.0 feet.	
CL E to M	144
Sandier w/ increasing depth.	
Grades gray w/ orange mottles, saturated and softer 12 4	
at 12.0 feet.	. 30
15.0* 15.5* PEAT (PT) - Dark brown, moist. PT 16 M	

Boring / W	/all No.;	CSB-04	Start Date & Time: 8/	19/1999 0845	- Aya	Finisi	Date &	Time :		8/19/19	99 11	05 .	
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DEF	THS				S			]	SAM	LE INF	ORMA		or FID
Тор	Bottom		DESCRIPTION		GRAPHICS	l.D.	Interval	Recovery	Method	Moisture	Blow Count		or FIU ots / Remarks Headspace
15.5*	19.2	CLAY (CL) - Gray	, moist, soft w/ shells.	ada ( emga ja			16		,				
10.0						Н	to	1.2	,	м		0	5.7
		Grading dark gray	, harder at 17.1 feet.		in the state of th	П	l.	1.2				Ů	5.7
		8	e fine-coarse Sand an	d	CL		17.2	ع.ا					
		fine Gravel at 17.2	! feet.				17.2	0.4					
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		END	OF BORING AT 19.2	FEET		ļ	19.2			ļ			·
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Boring / W	/al] No,;	CSB-05		St	art Date &	Time:	08/1	9/99 1114		Boring Loc	ation	/ Coord	nates;	Meannachde	ndemodelentude	tantini (aliantani) ya Sa	gane and established the second se	anana had had ta'il fa anina za cha cashad
Lagged 8		K. Comire						9/99 1235		the second								
Project Na		Clark Refini	ng & Ma			Project N			8.10-001	1	Water State of the	Connectivin	antina ann an			Sicres (Antonios processos)	enegagaman menangung	_
Project Lo		Blue Island,	-			<u> </u>					Refe	r to Site	Plan					i N
Drilling Co	and the state of t	Clayton Env	<i>.</i>	Drilling I	Equipmen	t	Hyde	raulic probe u	nit								·	
Driller:		N. Bolivar		Orilling	Method:		Dire	ct push	<del>,,, , , , , , , , , , , , , , , , , , </del>									
Ground E	levation:	NA	eingirennu.		Top of C	asing Elev	vation	: NA	October 1 to 100 to									
Borehole	Dia.:	2"		Davelop	pment Met	hod:	<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>	NA										
Outer Cas	sing Dia / M	laterial / Leng	gth:	<u> </u>				NA										
Inner Cas	ing Dia. / M	faterial / Len	gth:					NA										
Screen In	terval / Mat	terial / Slot si	Z <b>Q</b> :					NA ·		- Contraction								
First Wate	er: 5.8		Static V	Vater,		eganinistrikanistrikas		**************************************							•		٠	
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2.6	15.3	SILTY	CLAY	Y (CL	_) - Gra	y brow	v⊓, t	race she	lls w/ black		В	to			м	<i>.</i>	2.0	52
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Boring / V	Veil No.:	CSB-05	Start Date & Time:	8/19/1999 1114		Finis	n Oate 8	. Time :		8/19/19	99 12	35	
Project N		Clark Refining & Mkt., Inc.	Project No.: 15-	99038,10-001		Logg	ed By:	K. Com	ire			· · · · · · · · · · · · · · · · · · ·	
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Тор	Bottom		DESCRIPTION		GRAPHICS	I.D.	Interval	Recovery	Method .	Moisture	Blow Count	PID o Measuremen Scan	or FID nts / Remarks Headspace
2.6	15.3	SILTY CLAY (CL)	- continued		.CL	Н	14 to	2		М		2.0	45
15.3	16.9	PEAT (PT) - Dark Sheening observe		oling tube.	PT		16 16	2		-			
16.9	18.1	CLAY (CL) - Gray				- 1	to 18	2		м,		0	80
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Boring / W		CSB-05		Start Date		08/19/99 1425		Boring Lo	cation	/ Coord	inates:					
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Project Na	me:	Clark Refini	ng & Mark	eting, Inc.	Project N	lo.; 15-99036	3.10-001					•				<b>1</b>
Project Lo	cation:	Blue island,	IL.						Refer	to Site	Plan					N
Drilling Co	). <b>;</b>	Clayton Env	/. Dri	illing Equipm	ent:	Hydraulic probe un	nit	al and a second								
Driller.		N. Bolivar	Dri	illing Method	!:	Direct push										
Ground E	levation;	NA		Торо	f Casing Elev	ration: NA										
Borehole	Die.:	2"	De	velopment l	Aethod;	. NA		appearance of the second								
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First Wate	r. 2.6 feet		Static Wat	er.											•	
Date: 8/1	9/99		Date:										2			
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DEF	THS											SAM	PLE INF	ORMA	TION	
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0.3	2.6	SILTY	CLAY (	(CL) - Da	ark gray v	w/ black stain	ning, moist.		A	to			м		0	1.6
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8.0*	8.3*	SILTY	CLAY	(CL) - BI	ack, moi	st w/ peat.		CL			·					
8.3*		<u> </u>	Albarolista bereken berarian				· · · · · · · · · · · · · · · · · · ·	l	monofiles.	8					1	]
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9.8*	15.8	CLAY	(CL) - C	Gray, mo	ist, soft v	w/ shells.									]	ļ · ;
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		Peat le	ns - Da	rk browi	n, moist	13.8-13.9 fee	t.	Tichen Tichen	F	to			М		J	1.2
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Project Name   Court	Boring / V	Vell No.:	CSB-06 Start Date & Time: 8/19/1999 1425		Finish	n Date 8	Time:		8/19/19	99 16	550	
DESCRIPTION   DESCRIPTION			Clark Refining & Mkt., Inc.   Project No.: 15-99036,10-001		Logg	ed By:	K. Com	North Control Control	teriore di benedich			
9.8* 15.8 CLAY (CL) - continued. Peat lens - Dark brown, moist, 14.1-14.2 feet. Sheen on water brought to surface w/ 12-16 ft. sampling tube.  15.8 20.0* SILTY SAND (SM) - Dark gray, saturated, fine w/ trace medium-coarse Sand.  END OF BORING AT 20.0 FEET  * Estimated depths - Sediments extruded from sampler due to shattered tube.	DEI	PTHS		_				SAM	PLE INF			
9.8* 15.8 CLAY (CL) - continued. Peat lens - Dark brown, moist, 14.1-14.2 feet. Sheen on water brought to surface w/ 12-16 ft. sampling tube.  15.8 20.0* SILTY SAND (SM) - Dark gray, saturated, fine w/ trace medium-coarse Sand.  END OF BORING AT 20.0 FEET  * Estimated depths - Sediments extruded from sampler due to shattered tube.	Тор	Bottom	DESCRIPTION .	SRAPHICS	Ď.	nlerval	Recovery	Aethod	Acisture	How Count	Measureme	nts / Remarks
14.1-14.2 feet. Sheen on water brought to surface w/ 12-16 ft. sampling tube.  15.8 20.0* SILTY SAND (SM) - Dark gray, saturated, fine w/ trace medium-coarse Sand.  SM H to SM L TO SM L TO S	9.8*	15.8	CLAY (CL) - continued. Peat lens - Dark brown, moist,					_			, Gen	neadspace
15.8 20.0* SILTY SAND (SM) - Dark gray, saturated, fine w/ trace medium-coarse Sand.  SM H to S - 1.3  END OF BORING AT 20.0 FEET  * Estimated depths - Sediments extruded from sampler due to shattered tube.			·	CL	G	to			М		<del>-</del>	4.2
trace medium-coarse Sand.  SM H to S 1.3  END OF BORING AT 20.0 FEET  Estimated depths - Sediments extruded from sampler due to shattered tube.	450				- Anna Anna	46	2		_	<u> </u>	1	
END OF BORING AT 20.0 FEET  * Estimated depths - Sediments extruded from sampler due to shattered tube.	75.8	20.0*		No.	-	,,,			-			
END OF BORING AT 20.0 FEET  * Estimated depths - Sediments extruded from sampler due to shattered tube.			trace medium-coarse Sand.	Apssaramentekki		·16	1		-			
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END OF BORING AT 20.0 FEET  * Estimated depths - Sediments extruded from sampler due to shattered tube.				Strange and the strange and th	***************************************							
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* Estimated depths - Sediments extruded from						20				ļ		
sampler due to shattered tube.		-	END OF BORING AT 20.0 FEET		<u> </u>	ļ			<u> </u>	<u> </u>		
sampler due to shattered tube.						ľ				<u> </u>	-	
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			sampler due to shattered tube.		Section 1						4	
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Boring / W		CSB-07 K. Comire				Time:				Boing Coc	aueit 7	COUIGN	10103.					
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Project Na	·····	Clark Refining		Keeng, In	C. :	Project N	0	13-99030	), 1U-UU I		Defer	to Site	Dian					Ţ
Project Lo		Blue Island, IL				*	1. oden ette	c probe un	100-2014		Naid	w site	r (CE) (					И
Drilling Co		Clayton Env.		rilling Eq														
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Ground E		NA			·	esing Elev	ration:	NA NA	***************************************						-			
Borehole (		2*		evelopm	ent Meu	100;		NA NA										
		laterial / Length						VA VA	·									
<b></b>		laterial / Length																
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	r. 4.0 feet		atic Wa	iter;			<u> </u>	*	<u></u>									
Date: 8/2			ate:				ļ			Surface Co					<del></del>	***************************************	and the state of t	
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Тор	Bottom				Ð	ESCRIPT		GRAPHICS	·	interval	Recovery	Method	Moisture	w Count		nts / Remarks		
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0	0.2	GRAVEL	÷	Windowston to Ac	~~~					GRAV		0	1.3					
0.2	3.5	FILL - Sa	and, l	brown	, moi	st and	gravel	from (	0.2-1.4 feet.		Α	to			м		0	0.2
		Silty Clay	- Br	own t	o gray	y brow	n w/ b	lack sta	aining,	F	,		2					
		moist, tra	ce fi	пе-со	arse (	Sand.				1		2	_					
										L		2	2					
		Brick lens	s froi	m 3.2-	-3.5 fe	eet.				L	1	to	_		м		0	0.5
		Gravel le	ns -	black	staine	ed and	l clinke	ers fron	n 2.9-3.2 ft.		В	į	,		14.		ľ	0.5
3.5	5.5	SILTY S	AND	(SM)	- Gra	ıy, moi	st, fine	).				4	2				]	
		Clayey S				-			st			4						
		from 3.5-			•	•				SM			1.1				1	
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5.5	7.3	-		Mediate Commen		*********		*	ge mottles,			6	2				1	
0.0		saturated				g	,	•	<b>3.</b>	CL-		6						
		Saturated	4 VO7		<b>4,14.</b>					ML			2		s		1	
											D	to	_				0	0.4
7.3	8.0	SILTY C	LAV	' (CL)	- Grav	v w/ or	ange i	mottles	moist	CL		8	2		М		1	
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8.0*	9.1*	SILTY S	AND	(2M)	- Bro	144M, \$2	uurate	u, iine.	•	SM		8			s	-	1	
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9.1*	9.8*	SILTY C	LAY	(CL)	- Gra	y, mois	st w/ p	eat.		CL					М	-	-	
	independent pedanaka je						e santana pananga			1	E	to		<u> </u>		_	0	0.3
9.8*	11.5*	PEAT (P	PT) -	Dark i	browr	n, mois	t							]			-	
	<u> </u>									PT			4	1	М			
		·				·		·			Į	12						
11.5*	18.0	SILTY C	LAY	(CL)	- Gra	y, mois	st					<u> </u>			<u> </u>			ļ
	l									Name of the last		12	2				1	
		Peat lens	s - D	ark br	own,	moist	from 1	2.5-12	.7 feet.	CL	F	to			м		0	0.3
		Clay lens	s - G	ray, n	noist,	soft w	shells	from	12.7-13.2 ft.		ľ	"	2	1	"		]	"
		Grades I		•								14	1					
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Page 1 of 2

Baring / W	/ell No.;	CS8-07	Start Date & Time:	8/24/1999 0905	5		Finish	Date &	Time :		8/24/19	99 11	25	
Project Na		Clark Refining & Mkt., Inc.	Project No.; 15-990	)36,10-001			Logge	ed By:	K. Com					
DEI	THS		and the state of t					1	1	SAMF	LE INF	ORMAT	ION	
Тор	Bottom		DESCRIPTION		n out to the state of the state	GRAPHICS	.D.	interval	Recovery	Method	Moisture	Blow Count	PID o Measuremen Scan	or FID nts / Remarks Headspace
11.5*	18.0	SILTY CLAY (CL)	- continued					14	1.5			·		
		Clay lens - Gray, r	noist, soft w/ shell	s from	A CONTRACTOR OF THE CONTRACTOR		G	to	2		M	·	0	0.3
		14.8-14.9 feet.			or other statements	CL		16 16	6					
				**	annama and a		н	to	1.3		м		0	0.4
		END	OF BORING AT 1	8 O FFFT				18	2	;			,	
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Project Na	me:	Clark Refinin	g & Marke	ting, Inc.	Proje	ect No.:	15-99038	3.10-001					t at them to the them to the	arringar a kinakinar		and the second second second second second second second second second second second second second second seco	4
Project Lo	cation:	Blue Island, i	L							Refer	to Site	Plan					N
Drilling Co	).;	Clayton Env.	Drill	ling Equi	pment	H	ydraulic probe ur	nit									
Driller:		N. Boliver	Drill	ling Meth	od:	D	irect push										
Ground E	levation:	NA	alle en en en en en en en en en en en en en	To	of Casing	Elevat	ion: NA	an asamata Ngalaga ta pagungan an amanga minima Ama									
Borehole I	Dia.:	2"	Dev	elopmer	nt Method:		NA.	· · · · · · · · · · · · · · · · · · ·									
Outer Cas	ing Dia / M	aterial / Lengi	th:			, <del></del>	NA										
Inner Casi	ing Dia. / M	zterial / Leng	th:				NA										
Screen Ini	terval / Mat	erial / Slot size	6:				NA										
First Wate	r. 4.0 feet	s	Static Wate	ır.	eru		_		Ī								
Date: 8/2	4/99	c	)ate:														
Time (lus)	):	ī	îme:				···		Surface C	onditio	ns: Asj	hait					
DEF	THS			meekalyksyllisijo <u>e</u>			o la contrata de la facilità de la contrata del contrata del contrata de la contrata del contrata de la contrata del contrata de la contrata del contrata del contrata del contrata del contrata de la contrata del co	Alloway Programme Control of the Con					SAM	PLE INF	ORMA	TION	
Тор	Bottom				DESCR	OTTE	N .		GRAPHICS		interval	Recovery	Method	Moisture	Blow Count	Measureme	or FID nts / Remarks
				·····		annestores.			<u> </u>	G.	<u>E</u>	Å.	M	ž	<b>26</b>	Scan	Headspace
<u> </u>	0.2	ASPHAI			·				ASPH		١	0.9	-	H			
0.2	8.0						rom 0.2-0.8		and the second	Α	to					0	0.7
		Silty clay	y, dark	browi	n w/ blad	ck st	aining, mois	st w/			_	1.8		М			
		trace fin	e-coars	se Sai	nd, fine	Grav	vel, and Brid	ck.	innemer.		2						
	:										2	2				,	
									No.	В	to			м		0	0.4
									F			2					
		Grades	gray w	/ blaci	k stainin	ng, sa	aturated				4	1					
		w/ little f	ine-coa	arse S	and at a	appr	oximately 4	.0 feet.	L		4	1.6					
						• •			L			1.0		s			
		Sandy c	lav len	s - sa	turated:	from	5.5-5.7 fee	et.		C	to			3		0	1.0
24220		J	,					-			6	2					
		Grades	acav w	/ oran	ae mott	llae i	moist w/ fin	e Sand			6						
		trace ro			-			o ourru,	Z. C.			2					
		u ace 100	uis al a	אט ועף:	anately.	J.U	iee.		TO STATE OF THE ST	Đ	to	<del> </del>		М	<del> </del>	0	1.1
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	40.00	00 20/	71 A Y /	~! \	<u> </u>		and and	! tro oo ====		_	8	<u> </u>					
8.0	10.7	SILIY	) A Aسام	UL) -	Gray, Sa	atura	nea, son W/	trace roots.		1		1.5					
									CL	Ε	to	<del> </del>	1	s		0	1.0
												2					
	:	1									10	ļ			_		
			ayan and the second		de and and a name of the particular desired	enemography and			<u> </u>		10	2		s	<u> </u>		
10.7	11.6	PEAT (I	PT) - D	ark br	rown, m	oist.			PT	F	to	<u> </u>	l			0	0.9
					nickija iliko kalaininina kariinina			and the second s				2		М	<u> </u>		
11.6	16.0	CLAY (	CL) - G	ray, n	noist, so	oft w	shells.				12	Ĺ		<u> </u>			
											12	1.8					
5		Grades	to Siltv	Clay	gray, m	oist.	hard w/ tra	ce	CL.	G		1.8		м		0	0.9
NAMES OF THE PARTY			-					ıt 12.9 feet.	list and the second	9	to			IVI		"	0.9
							•		7 11 10 10 10 10 10 10 10 10 10 10 10 10		14	2					
ŧ				J	A	. 1/2/111111111111/1/11	· · · · · · · · · · · · · · · · · · ·			1	1	L		1	<u> </u>	<u> </u>	1

Boring / V	Vell No.:	CS8-08	Start Date & Time	e: 8/24/1	999 1233		Fini	sh Date	& Time :		8/24/19	99 143	7	
Project N	ame:	Clark Refining & Mkt., Inc.	Project No.:	15-99036.10-00	)1		Log	ged By:	K. Com	/A/COMANA A A A A A A A A A A A A A A A A A A	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
DEI Top	PTHS Bottom		DESCRIP	TION		GRAPHICS		interval	Recavery	Method	Moisture 37	Blow Count	PID o Measuremer	ts / Remarks
11.6	16.0	CLAY (CL) - conti	nued		a alluwal social qoqqogomuu aa asaa asaa ah is dhaa caysa	Cr 22	(C)	14	1.6	We	₩ M	油	Scan 0	Headspace
		END (	OF BORING	AT 16.0 FE	EΤ.			16	2					
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Borin	g / We	all No.:	CSB-09 Start Date & Time: 8/24/1999 1446	remandification (eg)	Finish	Date &	Time :		8/24/199	9 161	1	
Proje	ct Nar	me:	Clark Refining & Mkt., Inc. Project No.: 15-99036.10-001	V200244012000000000000000000000000000000	Logg	ed By:	K. Com	and and all the second	***********************			
To	OEP1	THS Bottom	DESCRIPTION	GRAPHICS		Interval	Recovery	Method	Moisture FIE TVL	Count	PID	or FID hts / Remarks
11	.6	16.0	CLAY (CL) - continued	GRV	.a.i	14 14	э <sub>в</sub> у 2	Met	Moi	Blow	Scan	Headspace
A CONTRACTOR OF THE PARTY OF TH	.	į		CL	Н	to 16	2		M		0	0.6
	_	tinaisista parquisi kabatusi	END OF BORING AT 16.0 FEET		_							
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		, sec										
				A from the grant of the first o								
A CONTRACTOR OF THE CONTRACTOR												
NAMES OF THE PROPERTY OF THE OWNERS OF THE OWNER.					And the second s							
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Instalyers Management of the state of the st				spanisticates as a second seco								
ministration of the state of th				M Partin Charles and the Control of								

Boring / W	fall blad	CSB-10		Start Date &	Time:	08/24/99 1654		Boring Loc	atico i	l Coardi	nates.	and a franchist of the section of th				
	···	K. Comire				08/24/99 1821	-	Soring Coo	<u> </u>	000101	i lates.				·	
Logged By		Ammonia American Amer		Market Control of the	Mirital State South	iinnaa ji	2 40 000		*****			No-control of the Control of the Con	neseenneseen		googlassieren en	
Project Na			ing & Markel	ung, Inc.	Project N	io.: 15-99036	5,10-001				<b>.</b>					T <sub>1</sub>
Project Lo	cation:	Blue Island	Alexandra Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Maria Mari	······································		FAUITINE FAUIT CONTINUE FAUIT CONTIN			Refer	to Site	Plan					N
Drilling Ca	).;	Clayton En	v. Drill	ing Equipment	t	Hydraulic probe un	it ·									
Onlier:		N. Bolivar	Drill	ing Method:		Direct push										
Ground E	levation:	NA		Top of C	asing Elev	ration: NA										
Barehole (	Dia.;	2"	Dev	relopment Met	hod:	NA NA										
Outer Cas	ing Dia / M	laterial / Len	gth:			NA.										
Inner Casi	ing Dia. / M	laterial / Len	gth			NA										
Screen int	terval / Mat	erial / Slot s	ize:			NA ·										
First Wate	r. 5.0° feel	l	Static Wate	r.	-								-			
Date: 8/24	4/99	-	Date:													
Time (hrs)	i:		Time;					Surface Co	onditio	ns: Gra	avel				governous de la company	
	THS			2000 - 2000 / 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 - 1000 -	hilletileeeststätisee <u>s</u> ses					menonoheen		SAM	PLE INF	ORMA	TION	
								S.						•		or FID
Тор	Bottom			. D.	ESCRIPTI	ION		GRAPHICS		Interval	Recovery	Method	Moisture	v Count		nts / Remarks
	200000000000000000000000000000000000000		207-20	iiii Nalaali aadaa Vy-yo aa	ar (No. 1885) sans full and are further			GR/	ō.	<u>s</u>	Rec	Met	Se	Blow	Scan	Headspace
0	0.2	GRAVI	EL.					GRAV		0	1.3					
0.2	4.6	FILL -	Sand, da	ark brown	, moist	:w/ some me	dium-			,	1.5		R A			
		B .				from 0.2-2.2 f			Α	to			M		. 0	9.7
				m 1.7-1.9				F		2	2					
										2						1
				2.0-2.2 fe						-	2					
		Silty CI	ay - Dar	k gray w/	black s	staining, mois	st, w/		В	to		•	M		0	22
		some fi	ine Sand	d and trac	e medi	ium-coarse S	and	L			2					
		from 2.	2-4.6 fee	et.						4						
										4	1.5		м			
4.6	5.1	SILTY	CLAY (	CL) - Dk g	r w/ bl	k stains, moi:	st w/ f. Sand.	CL.			1.5		IVI			1
5.1		SII TY	SAND (	SM) - Gra	v brow	n w/ orange	mottles		C	to					200	1000
1 "	9.9	1	•	•	-	iii w olalige	motiloo,			6	2	İ .	Ş		1	
.		piack s	taining,	saturated	•					<del> </del>			-			
										6	2		]		ł	-
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		Grades	s gray at	7.2 feet.				SM			2					
										8				<u> </u>		
		Trace	roots fro	m 8.0-9.5	feet.	•				8						•
MIII A			-		-						0.5				]	
									Ε	to			S	$\vdash$	20	560
		0	AL	A1\	'			1		10	2					
9.5	77.3	1	-	UL) - Gray	y, satui	rated w/ fine	sano,			<u> </u>						<u> </u>
		trace re						CL		10	2		s			
		Sand g	rades o	ut at 10.7	feet.		on a sure of the s		F	to				<u> </u>	100	290
11.3	12.0	PEAT	(PT) - Da	ark brown	, moist	t.		PT	-	-	2		м		]	
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12.0	16.0	CLAY	(CL) - G	ray, moist	t soft v	v/ shells	ergani (egani meringan) er ermi (ele (egane) eres			12		b-no				
			,, - 0	,	.,	41.01101					1,1	[.				
			٠, ۵	01	_			CL	G	to	-	1	М	<b> </b>	4.0	54
		1	-			st, hard w/ tra	ice				2			<del> </del>		
	(A	fine-co	arse Sai	nd at 13.5	feet.	C.		1		14	<b>1</b>	50) P. C. A. (4)	The second second second	<u> </u>	<u> </u>	

Page 1 of 2

Boring / V	/ell No.:	CSB-10 Sta	rt Date & Time: 8/24/1999 1	654			Date 8			8/24/19	199 18	21	
Project Na	eg-mynamonyaye/is/AA	Clark Refining & Mkt., Inc. Pro	eject No.: 15-99036,10-001			Logg	ed By:	K. Com		Automostorius	and the second s	555444555500000000000000000000000000000	
DEF	THS								SAME	LE INF	ORMA		
Тор	Bottom		DESCRIPTION		GRAPHICS	.D.	Interval	Recovery	Method	Moisture	Blow Count		its / Remarks
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12.0	16.0	CLAY (CL) - continue	ea				1**	1.6			· ·		
		·			CL	н	to			М		1.0	21
								2					
	***************************************	END OF	BORING AT 16.0 FEET	annes (17 inskir) jammas een maas (18 i			16						
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			inch of free product recove	red									
		from open boreho	e upon completion.										
		min (1)									<u> </u>		
AND THE REAL PROPERTY.					MANUAL PROPERTY OF THE PROPERT			1					
						SHIP CONTRACTOR		<u> </u>			<u> </u>		
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Parameter Company													
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	-Bbles	CS8-11	::::::::::::::::::::::::::::::::::::::	le.	art Date &	Tirese:	09/25/0	9 0800		Bóring Lo	cation	I Coore	linatee:	ZZ.Z.	teletaatuitteleteluu	engolymphopsis	allanen anna an ann an an an an an an an an an	
Boring / W					nish Date					DOING CO	CEUUIT	COUR	ii (4144.					
Logged By	and the second s	D. Lombard	عديد فروغايه الليني	1		<u> </u>	ogo openika.	gatagastratististististististististististististist	2 40 004			i kirkenye eki				/		
Project Na		Clark Refini		sikenuð,	, Inc.	Project N	<del>1</del> 0.;	15-99036	). 10-001		Defe	in Clin	Dia.					Ţ
Project Lo		Blue Island,		Ellina de la compansa	_		estamen mag	6725 <u></u>			Keist	to Site	men					N4
Drilling Co	i.;	Clayton Env			Equipmen	t		lic probe un	iit									
Oriller:	National (Nations of Nations)	N. Bolivar		Drilling	Method:	enon contraction of the contract	Direct p											
Ground E	levation:	NA .	<u>1</u>		ــــــــــــــــــــــــــــــــــــــ	asing Elev	vation;	NA	····									
Borehole I	Dia.;	7		Develop	oment Met	hod:	······································	NA										
Outer Cas	ing Dia / M	aterial / Len	gth:				-	NA										
Inner Cas	ing Die. / M	aterial / Len	gin:	· ,	,			NA										
Screen In	terval / Mat	erial / Slot si	ze:		saga	ili i dalam selendente de la constante de la c		NA .										
First Wate	er. 8.0 feet		Static V	Vater.			-	-										
Date: 8/2	5/99		Date:					· · · · · · · · · · · · · · · · · · ·					onnountary	t.Necessariitiiisat				Salah Nada Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Salah Sal
Time (hrs)	):		Time:		1920 and 197			and a single residence of the second side of		Surface (	Conditi	ons: A	sphalt /	Gravel	····	aliana ana managana		
DEF	THS													SAM	PLE INF		TION	
Top	Bottom				0	DESCRIPT	NON			HICS		78	,eu	v	e.	Count	4	or FID nts / Remarks
										GRAPHICS	Ġ,	Interval	Кесочелу	Method	Moisture	Blow (	Scan	Headspace
0	0.8	FILL - (	Grave	elly to	Clave	v Silt. t	orown	slightly	/ moist.									
	0.0		0.010	, .c	0.0,0	<i>y</i>		,		FILL		0					]	
	4.0	FILL - S	cilb. e.	~ Clo	Sa	nd me		brown t	o liaht				3.7				1	40-70
0.8	4.0	•	-							-							1	
		brown,		t, siig	nt odor	at 2-4	ieet,	SOIL, IIII	e sano,	FILL	Α	to			М		0-30	
		very mo								FILL								
		Petrole	um o	dor a	t 2.5 fe	et.							4					500-800
						:						4						
							inaganyia Milyin	akedynakoski ( <u>Majoro</u>			<u> </u>							
4.0	5.6	CLAYE	Y SA	ND (	SC) - N	Vottled	I, light	brown	to brown,									
		moist, s	soft, fi	ill, pe	troleun	n odor.	•			sc		4	3.7		М			200-800
					,	١											]	
5.6	6.4	SILTY	SAN	D (SN	/i) - Sat	t., f. Sa	nd, lt	brown,	some Clay.	SM	В	to			s		2-10	300-500
		Grades	to Cl	layey	Sand,	satura	ited, li	ight bro	wn, soft.	J							1	300-000
6.4	8.0	SILT to	CLA	YEY	SILT (	ML) - I	Vloist,	trace fi	ne Sand, soft,								] ·	
		å			_	•		at 7.5-8		ML		8	4		м		1	40-120
		black-c											•				1	
8.0	8.5		da						, saturated.	SM	1	$\vdash$	_		s			300
1711,4114,		SILTY			<del></del>	and the same and t	interventation of the second	inniversitatorio etterroro	Market and the second s			8			<del>-</del>	<u> </u>	1	
8.5	10.6						ıı yıd	y, auit, i	HOISE IO		100000		4				1	
		very m	oist, t	race	nne Sa	iΠŒ.				CL					VM	**********	-	10
		,									С	to				<u> </u>	2	
			and distributed and the same		alla a describir de la compansión de la compansión de la compansión de la compansión de la compansión de la co		e de la composición dela composición de la composición de la composición de la composición dela composición de la composición dela composición dela composición de la composición de la composición de la composición dela composición del composición dela composición dela composición dela composición dela composición dela composición dela composición dela composición dela c								<u> </u>	<u> </u>		
10.6	11.9	PEAT	(PT) -	- Darl	browr	w/ Cl	ay an	d Silt, m	ioist.	РΤ			4		]			
	Administrative Nation						inanerijani.					12			М			5-10
11.9	12.0	CLAYE	Y SI	LT (N	(L) - Lt	. дгау,	mo., s	soft, w/	shell frags.	ML								
12.0	19.6	SILTY	CLA	Y (CL	) - Dar	k gray,	mois	t, stiff, t	race fine			12	1.8					
-		Gravel		-	-						1		'.8		B.A		] ,	30
										CL	D	to			М	ļ. —	2	30
												14	2				1	· .
L		I.		and the second		23.1117.01.25.01.25.01.01.01.01.01.01.01.01.01.01.01.01.01.	and the state of the state of	NAMES AND POST OF THE PARTY OF	Vina - Marie - India - India - India - India - India - India - India - India - India - India - India - India -	<u> </u>	1		January Company	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	16	1		

Boring / V	/eil No.:	CSB-11 Start Date & Time: 08/25/99 0800		Finish Date & Time : 08/25/99 1045								
Project Na	eme:	Clark Refining & Mkt., Inc., Project No.: 15-99036.10-001		Logged By: D. Lombardi SAMPLE INFORMATION								
DEPTHS							SAM	PLE INF		ATION		
Тор	Bottom	DESCRIPTION	GRAPHICS	O'I	Interval	Recovery	Method	Moisture	Blow Count		er FID nts / Remarks Headspace	
12.0	19.6	SILTY,CLAY (CL) - continued			14					Joan,	rieduspaçe	
	10.0					2						
		Some organic nodules at 14-16 feet. Organic seam		E	to			SM	<u> </u>	0	5	
		at 15.6 feet and medium gravel seen at 16 feet.	Mary Mary Company		16	2				1		
		Medium brown to gray at 16 feet, hard, fine-medium	and the same of th	-	16				<u> </u>			
		gravel, shale clasts, slightly moist to moist. PID	CL	ille segretario		1.8						
anaman kan		reading registered, but may have occurred due to		F	to			М		10.2	10-30	
		muddy water in sampling tube.			18	2			一			
		Shale and limestone clasts at 18-19.6 feet.	Į.	<u> </u>	18				1	<u> </u>		
			NAMES III AND A STATE OF THE ST			2	SM	-	1			
			NAME OF TAXABLE PARTY.	G	to			SM	-	0	1.0	
19.6	20.7	SILT (ML) - Light gray w/ slight olive hue, some	<b>-</b>		20	2						
13.0	20.7	medium-coarse Gravel, slightly moist.		-	20				+			
		Gravelly Silt at 20 feet - Light gray, medium-coarse	ML		to -	0.7			1			
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Project Name: Clark Refining & Marketing, Inc. Project No.: 15-99036.10-001									*********							<b>A</b> .				
Project Location: Blue Island, IL								Refer to Site Plan												
Drilling Co.: Clayton Env. Drilling Equipment: Hydraulic probe unit							<b>1</b>													
Driller: N. Boliver Drilling Method: Direct push																				
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1.9						k and light		Α	to			IA1	-	_	0					
						trace	ace fine Gravel,				4				]					
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5.1	10.0	SILTY SAND (SM) - Light brown, some Clay, saturated, fine-medium grained.										7		S			0			
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													·				-			
		No she	en or	odors	s at 6.0	0-6.8 fe	et.	•							s					
		**************************************							SM		8	Ī		Ĭ		]				
		Some Clay w/ Clay stringers, less silty at 8.0 feet. No							A141											
		sheen	or odo	rs at	6.8-8.	0 feet.														
		Sandy a	Sandy at 8.0-9.4 feet - light brown, saturated, fine-medium									8	4							
		grained, trace coarse grained. Grades to light gray Silty																		
		Sand at	and at 9.4 feet, trace Clay, medium-fine, some coarse Sand.  AND (SP) - Light gray, fine-medium, saturated, trace							С	to			s		<u> </u>	0			
10.0	10.7	SAND							SP											
		silt, some root frags, grades to SM at 10.5-10.7 feet.							J OF			4								
10.7	11.4	SILTY	SILTY SAND (SM) - Lt gray, tr CL, sat, f-m, tr. root frags							SM		12								
11.4	13.0	SILTY	SILTY CLAY (CL) - Lt gr, mo, v. soft, Clayey, organic								L				М					
		stringer	s 11.8-	12 ft, (	grades	dk brn a	at 12 ft. (	CISt to	o SiCI,	CL		12	1.5							
		PT zn, d	dk bm,	s. mo	, grade	s CISt, v	w/ shell fr	rag zn	12.7-13 ft.		D	to	-		М			0		
13.0	13.5	CLAYE	EY SIL	.T - L	t gr, le	ss she	lls, mois	st, Cla	зуеу.	ML		10								
13.5	14.3	SILTY SAND (SM) - Lt gray to gr brn, moist, f-m grained.							SM		14									

Boring / W	/ell No.:	CSB-12 Start Date & Time: 8/25/1999 1155	Finish Date & Time : 8/25/1999 1552								
Project Name: Clark Refining & Mkt., Inc. Project No.: 15-99036.10-001						D. Lom	bardi	Allerani	**************************************		open p <sub>e</sub> mne
DEPTHS							SAM	PLE INF	ORMA	TION	
Тор	Bottom	DESCRIPTION	GRAPHICS	.D.	interval	Recovery	Method	Moislure	Blow Count		or FID hts / Remarks
13.5	143	Poor Recovery - Silty Sand at 14.2-14.3 feet.	SM	Ť	14	<u> </u>	-E	- 4E	ш.	ocan .	Headspace
14.3	entition production	CLAYEY SILT (CL) - Light gray, moist, w/ shells and		E	to	1.8		М		_	0
		shell fragments, crumbly and soft.	CL			2					
·		Grades to Silty Clay (CL) towards 16.0 feet.			16						l L
16.0	16.5	NO RECOVERY			16	1.5					
16.5	16.9	SILTY CLAY (CL) - Med gr, very soft, plastic, moist w/ shell frags	CL	] F		'."				1	
16.9	21.8	SILTY CLAY (CL) - Till, gray-dark gray, moist, some	***************************************		to	•	М	M			. 0
		fine-medium gravel, hard.			18	2					
		Dark gray, moist, hard, some fine-medium gravel at			18	2		•			
		18-20 feet.		G	to			М		<del> </del>	0
			CL			2				1	
				_	20	ļ			<u> </u>		
		Moist, hard, trace medium-coarse gravel at 20.0 to	OTTO CONTROL OF THE PERSON OF		20	1.7		м	ļ		
		21.8 feet.		н	to	<u></u>					0
	one continue and comme			-		2					1
21.8	24.7	SILT (ML) - Light gray, soft, moist.			22						ļ
		Very moist to saturated at 22-24 feet, laminated at 24		100	22	1.7	,	М			
		feet, crumbly.	ML	ı	to	2		s			0
									<u> </u>		
		•	e de la companya de l	$\vdash$	24	<del></del>		-			
					24			s	_		
86.9		OF TARIAN (OL) Till dad, and back for madicus		J	to						0
24.7	28.0	SILTY CLAY (CL) - Till, dark gray, hard, fine-medium	and the same of th		26	2		М	-		
		Gravel, moist.		-	26	├-			<b> </b>		<del> </del>
					120	2			<u> </u>		
					to		N	M			0
					28	2					
28.0	28.5	GRAVELLY SILT to SILT (ML) - Light gray, saturated			28			<del> </del>	$\vdash$		<u> </u>
20.0	<b>49.</b> 3	very coarse limestone fragments, clasts angular, Silt		gommana		0.5		s		4	
		matrix at base of sample.	ML		to				-		0
		REFUSAL AT 28.5 FEET		0000000000	28.5	0.5			-	1	
		REPOSALAT 20.3 FEG.		_				ļ		1	
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## ATKEARNEY

A.T. Kearney, Inc. 222 West Adams Street Chicago, Illinois 60606 312 648 0111 312 223 6200 Fax

RZ2.R05020.01,ID,152

August 26, 1997

Mr. Brian Freeman
US Environmental Protection Agency
Region 5 DRE-8J
77 West Jackson Boulevard
Chicago, IL 60604

Reference:

EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Clark Refining

and Marketing, Inc.; Blue Island, Illinois; EPA ID No. ILD005109822; Trip and

Analytical Results Report; Task 06 Deliverable

Dear Mr. Freeman:

Please find enclosed A.T. Kearney's Trip and Analytical Results Report for the Clark Refining and Marketing, Inc. (Clark) facility in Blue Island, Illinois. This report summarizes visual observations and sample analyses resulting from site visit and sampling event that was conducted at the facility on July 28, 1997. The samples were analyzed by the Intertek Testing Services in Richardson, Texas. A.T. Kearney performed data validation on the resulting laboratory data package. Please note, the complete data package will be submitted under separate cover.

Please feel free to contact me at (312) 345-8963 or Mr. Robert Young, the A.T. Kearney Technical Lead at (312) 345-8966 if you have any questions.

Sincerely,

Patricia Brown-Derocher

Patricia Brown Derocher

Regional Manager

cc:

F. Norling, EPA Region 5 (w/out attachment)

A. Wojtas, EPA Region 5

B. Jordan

R. Young

45 7765 ( 030/945)

A. Williams

## CLARK OIL REFINING EPA ID NO. ILD005109822 TRIP AND ANALYTICAL RESULTS REPORT

## Submitted to:

Mr. Brian Freeman
U.S. Environmental Protection Agency
RCRA Enforcement Branch
Region 5 DRE-8J
77 West Jackson Boulevard
Chicago, Illinois 60604

## Submitted by:

A.T. Kearney, Inc. 222 West Adams Street Chicago, Illinois 60606

EPA Work Assignment No. Contract No. Kearney WAM Telephone No. EPA WAM Telephone No. R05020 68-W4-0006 Patricia Brown-Derocher 312/345-8963 Brian Freeman 312/353-2720

## CLARK REFINING AND MARKETING, INC. EPA ID NO. ILD005109822 TRIP AND ANALYTICAL RESULTS REPORT

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## 1.0 Summary of Field Activities

A sampling inspection was conducted by Mr. Robert Young and Mr. John Koehnen of A.T. Kearney, Inc. on July 28, 1997 at the Clark Refining and Marketing, Inc. (Clark) facility in Blue Island, Illinois (EPA ID No. ILD005109822). In addition, the following personnel were involved, either at the Clark site, in preliminary meetings, or via telephone, at various times during sampling activities:

Mr. Brian Freeman - U.S. EPA Work Assignment Manager

Mr. Allen Wojtas - U.S. EPA Technical Lead

Ms. Margo Dusenbury - U.S. EPA National Enforcement Investigations Center (NEIC)

Mr. Dave Beener - Clark Oil Refinery

Mr. Jerry Fields - Clark Oil Refinery

This report describes the significant elements of the sampling visit at the Clark facility in Blue Island, Illinois. The actual sampling activities were conducted by the A.T. Kearney field personnel, under the direction of Mr. Brian Freeman, U.S. EPA Work Assignment Manager (EWAM). The purpose of the sampling visit was to collect supplemental samples from key areas which were noted during a large-scale sampling effort previously performed by U.S. EPA. The environmental samples collected were analyzed for Toxicity Characteristic Leachate Procedure (TCLP) Volatile Organic Compounds (VOCs) and TCLP metals. The associated quality control (QC) samples were prepared and analyzed for total VOCs and total metals, with the exception of the duplicate and matrix spike/matrix spike duplicate (MS/MSD) samples which were analyzed for TCLP VOCs and TCLP metals along with the environmental samples.

## 2.0 Summary of Sample Collection Activities

The sample collection procedures proposed for the Clark facility sampling inspection, as documented in the procedures outlined in the Site-Specific Sampling and Analysis Plan (SAP) submitted to U.S. EPA on July 24, 1997, were followed, with the exceptions described below. Only disposable sampling equipment was used, and all equipment was decontaminated prior to the site visit, in accordance with the SAP. Used sampling and safety equipment were accepted by Clark representatives for disposal, therefore no post-inspection decontamination was required.

Samples were collected from several different areas of the facility, as outlined in the SAP. At the request of facility representatives, A.T. Kearney field representatives provided Clark with a split sample at each sampling location. Per the direction of the EWAM, A.T. Kearney field personnel provided the Clark representatives with pre-cleaned containers for the split samples. Sample locations are summarized in Table 1 and procedures used to collect samples are described below. Photographs referenced in the descriptions are contained in Appendix A of this report.

<u>Tank 59 (Photographs 1 through 4)</u> - In accordance with the SAP, three liquid samples (TK-59-1, TK-59-3 and OP-1) were collected in the vicinity of Tank 59. Duplicate samples TK-59-2 and OP-2 were collected at locations TK-59-1 and OP-1, respectively. The sampling locations, times and parameters analyzed are summarized in Table 1.

TK-59-1 and TK-59-2 were collected from a valve in the influent line, directly adjacent to the tank. The samples were collected by allowing the wastewater to flow directly into the sample containers. TK-59-3 was collected from a sump-like depression located approximately 20 feet east of Tank 59 (see Photograph 2 in Appendix A). The sump-like feature measured approximately six by six feet and contained a dark, oily liquid that appeared to be at least one foot deep. It also appeared that the depressed area was unlined, and had been dug into the containment area of Tank 59 to collect overland surface flow. Clark representatives were not aware of when the sump-like feature was dug, or the purpose of the unit. It should be noted that the unit sampled was not the "Tank 59 Sump" shown on facility drawings (the "Tank 59 Sump" is located northeast of the tank, and in the background of Photograph 2). TK-59-3 was collected by dipping a pre-cleaned beaker into the "sump" and pouring the liquid into the sample containers. The beaker was re-filled between containers since the liquid immediately separated into phases upon collection.

OP-1 and OP-2 were collected from the overflow pit located to the west of Tank 59. The pit contained what appeared to be several feet of a dark, oily liquid which extended to about four feet below the top of the unit's concrete walls. The material was collected by dipping a precleaned beaker, attached to an extension pole, into the pit and pouring the liquid into the sample containers.

<u>Tank 55 (Photographs 5 through 7)</u> - In accordance with the SAP, one solid sample (TK-55-1) and one liquid sample (TK-55-3) were collected from the area directly beneath the iron pipe that discharges into the Tank 55 dike. The iron pipe was located south of Tank 55, along the southern containment berm. Duplicate sample TK-55-2 was collected at the TK-55-1 location.

The base of the containment area surrounding Tank 55 contained a thin layer of fresh gravel. However, it was apparent that several inches of the base material beneath the gravel was saturated with a petroleum-like product, as the sampling team sank in the material when walking in the containment area. Also, floating product was apparent on the surface of water that was pooled in the Tank 55 containment area.

Clark representatives indicated that petroleum-contaminated soil and gravel material had been recently excavated from the northern portion of the Tank 55 containment area. The contaminated material was placed in two large roll-off boxes, which were situated to the north of Tank 55. The roll-off boxes are shown in Photograph 7 in Appendix A.

TK-55-1, TK-55-2 and TK-55-3 were collected from an area where water had pooled beneath the iron pipe leading into the Tank 55 containment berm (Photograph 5). The water contained a floating product and a black, solid residue along the edges of the pool. TK-55-1 and the duplicate sample, TK-55-2 were collected by placing the black residue directly into the sample containers using a pre-cleaned stainless steel spoon. The residue formed a very thin layer around the pooled water, and there was not enough volume to allow for homogenization of the TCLP metals portion of the sample. Therefore, neither the TCLP VOC, or metals sample material were homogenized prior to filling the sample containers.

TK-55-3 was collected by dipping a pre-cleaned beaker into the pooled water/floating material and pouring the liquid into the sample containers. The beaker was re-filled between containers because the liquid immediately separated into phases upon collection.

Tanks 322 and 323 (Photograph 10) - In accordance with the SAP, one liquid sample (TK-322-1) was collected from the oily liquid present in the containment area surrounding Tanks 322 and 323. The sample was collected along the western berm, near Tank 322. As shown in Photograph 10 in Appendix A, oily liquid was present on the surface in several areas of the containment area surrounding the tanks.

TK-322-1 was collected by dipping a pre-cleaned beaker into the liquid in the containment area, and pouring the liquid into the sample containers. The beaker was re-filled between containers because the liquid immediately separated into phases upon collection.

<u>Tank 29 (Photograph 11)</u> - In accordance with the SAP, one liquid sample (TK-29-B1) was collected from the liquid present in the containment area along the east side of Tank 29. The sample was collected from below the valve at the eastern perimeter of the tank.

TK-29-B1 was collected by dipping a pre-cleaned beaker into the liquid in the containment area, and pouring the liquid into the sample containers. The samples were all collected from one beaker volume.

The collection of waste samples from the valves near the bottom of Tanks 28 and 29 was also proposed in the SAP. However, Clark representatives indicated that the valves had not been opened for several years, and were, therefore, hesitant to open the valves for sampling. In order

to avoid a potential major release, the A.T. Kearney field personnel Team did not attempt to sample at the valves. Clark representatives did indicate that the tanks could be sampled from the top using a bottle messenger-type sampler. However, the representatives also indicated that Tanks 28 and 29 manage spent caustic material with a pH of approximately 13-14, and these materials are sold to other companies as product. Therefore, the liquid material within Tanks 28 and 29 were not sampled during the site visit.

<u>Junction Box 38 Sump (Photograph 12)</u> - In accordance with the SAP, one liquid sample (S-38-1) was collected from the liquid present in the Junction Box 38 Sump. S-38-1 was collected by extending a pre-cleaned beaker into the sump and collecting the liquid pooled in the unit. The samples were all collected from two beaker volumes.

The SAP indicated that the sump would be visually inspected to locate potentially spilled petroleum product. However, the sump was covered by a large metal cover which could not be moved. Therefore, the material inside the sump could not be readily viewed or accessed. As previously indicated, sample S-38-1 was collected by extending a beaker through an access point in the metal cover, down into the liquid pooled at the base of the sump.

<u>Desalter Tank (Photographs 8 and 9)</u> - In accordance with the SAP, three liquid samples (DES-1, DES-2 and DES-3) were collected from the sampling taps at the Desalter Tank. DES-1 was collected from the wastewater portion of the tank. DES-2 was collected from the emulsion ("rag") layer, and DES-3 was collected from the oil portion of the tank.

Each of the waste streams at the Desalter Tank arrived at the sampling taps in a heated condition, reportedly at temperatures greater than 120°F. Due to the heated nature of the samples, the sampling team could not immediately handle the samples. Therefore, each of the samples at the Desalter Tank were collected using a beaker, which was allowed to fill with the wastestream, at the sampling tap. After the beaker was filled, the liquid was poured into sample containers (40-ml vials) housed within a foam-cushioned shipping package. The vials were capped using the foam material as an insulator, then placed into the sample cooler.

<u>Quality Control Samples</u> - Two trip blanks were placed into the sample coolers used to manage the samples collected, prior to the collection of the first sample. The trip blanks (TB-1 and TB-2) accompanied the investigative samples throughout the entire sampling event.

One field blank (FB-1) was collected in the refinery portion of the Clark facility, near Tanks 322 and 323, and the Desalter Tank. FB-1 was collected by directly filling sample containers with deionized/analyte-free water obtained from the laboratory. The VOCs portion of the field blank was preserved with HCL and the metals portion of the sample was preserved with HNO<sub>3</sub>.

In accordance with the SAP, three field duplicates were collected based on the variable matrices sampled during the site visit. In addition, as indicated in Table 1, additional sample volume was collected at three locations for matrix spike/matrix spike duplicate analysis.

Sample Handling/Management - Once the samples were collected, all samples were handled,

managed and shipped in accordance with the requirements of the SAP. Investigative samples were not preserved since they were wastes. Samples OP-1, OP-2, TK-59-3, DES-2, DES-3, TK-322-1, TK-29-B1 and TB-2 were shipped overnight as dangerous goods, while the remaining samples were shipped in a cooler as environmental samples. All sample arrived at the laboratory intact, and custody was documented throughout the collection and shipment activities.

TABLE 1
SAMPLE LOCATION SUMMARY

A.T. Kearney/Lab* Sample Identification	Sample Type and Location	Date/Time of Collection	Analytes/Comments
TK-59-1	Liquid - Tank 59 Influent	7/28/97 - 1000	TCLP VOCs / TCLP Metals w/ MS/MSD
TK-59-2	Liquid - Tank 59 Influent	7/28/97 - 1000	TCLP VOCs / TCLP Metals - Dup of TK-59-1
TK-59-3	Liquid - On Ground at T-59	7/28/97 - 1020	TCLP VOCs / TCLP Metals w/ MS/MSD
OP-I	Liquid - Overflow Pit	7/28/97 - 1115	TCLP VOCs
OP-2	Liquid - Overflow Pit	7/28/97 - 1115	TCLP VOCs - Dup of OP-1
TK-55-1	Solid - Stain area at T-55	7/28/97 - 1245	TCLP VOCs / TCLP Metals w/ MS/MSD
TK-55-2	Solid - Stain area at T-55	7/28/97 - 1245	TCLP VOCs / TCLP Metals - Dup of TK-55-1
TK-55-3	Liquid - On Ground at T-55	7/28/97 - 1220	TCLP VOCs / TCLP Metals
DES-1	Liquid - Desalter Wastewater	7/28/97 - 1400	TCLP VOCs
DES-2	Liquid - Desalter Emulsion (Rag) Layer	7/28/97 - 1415	TCLP VOCs
DES-3	Liquid - Desalter Oil	7/28/97 - 1425	TCLP VOCs
TK-322-1	Liquid - On Ground at T-322	7/28/97 - 1445	TCLP VOCs
TK-29-B1	Liquid - On Ground at T-29	7/28/97 - 1515	TCLP VOCs
S-38-1	Liquid - From Sump 38	7/28/97 - 1605	TCLP VOCs
TB-1	Trip Blank #1	7/28/97	Total VOCs
TB-2	Trip Blank #2	7/28/97	Total VOCs
FB-1	Field Blank	7/28/97 - 1310	Total VOCs/Metals

 <sup>\*</sup> A.T. Kearney and Laboratory sample designations are identical

## 3.0 Summary of Analytical Results

Samples were analyzed using the Toxicity Characteristic Leachate Procedure (TCLP) for VOCs and metals. The samples were analyzed by the Intertek Testing Services (ITS) Laboratory in Richardson, Texas, as specified in the A.T. Kearney SAP. Per Region 5 guidelines, the data were validated using the *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic and Inorganic Data Review.* The correlation between the A.T. Kearney sample designations and the locations and analytes is provided in Table 1. Tables 2, 3 and 4 present the analytical results for the samples.

<u>Tank 59</u> - The wastewater influent sampled at Tank 59 (TK-59-1 and the duplicate, TK-59-2) contained benzene at concentrations of 4.90 mg/l and 4.70 mg/l. These concentrations exceed the regulatory limit of 0.5 mg/l specified in Table 1 of 40 CFR 261.24. All other organic compounds were below detection limits and the regulatory limits in Table 1 of 40 CFR 261.24. All metals were below detection limits or were detected at concentrations below the regulatory limits specified in Table 1 of 40 CFR 261.24.

The oily liquid present in the "sump-like" area east of Tank 59 (TK-59-3) did not contain any VOCs at concentrations exceeding detection limits which were all below the regulatory limits specified in Table 1 of 40 CFR 261.24. All metals were below detection limits or were detected at concentrations below the regulatory limits specified in Table 1 of 40 CFR 261.24.

The oily liquid in the overflow pit (OP-1) contained benzene (104 mg/l), chlorobenzene (1.2 mg/l) and 1,2-dichloroethane (2.5 mg/l). The duplicate sample of the liquid (OP-2) contained benzene (79 mg/l), chlorobenzene (0.4 mg/l), chloroform (0.85 mg/L) and 1,2-dichloroethane (1.30 mg/l). The concentrations of benzene and 1,2-dichloroethane in the investigative and duplicate samples exceed the regulatory limits specified in Table 1 of 40 CFR 261.24.

<u>Tank 55</u> - The black residue material collected along the edge of the pooled liquid in the Tank 55 containment area (TK-55-1) did not contain any VOCs at concentrations exceeding detection limits which were all below the regulatory limits specified in Table 1 of 40 CFR 261.24. All metals were below detection limits or were detected at concentrations below the regulatory limits specified in Table 1 of 40 CFR 261.24. In addition, the duplicate sample (TK-55-2) did not contain any VOCs at concentrations exceeding detection limits or regulatory limits specified in Table 1 of 40 CFR 261.24, and all metals were below detection limits or were detected at concentrations below the regulatory limits specified in Table 1 of 40 CFR 261.24.

The liquid collected from the pooled spill material liquid in the Tank 55 containment area (TK-55-3) contained benzene at a concentration of 0.14 mg/L. This concentration is below the regulatory limit specified in Table 1 of 40 CFR 261.24 for benzene. No other VOCs were detected, and detection limits were below the regulatory limits specified in Table 1 of 40 CFR 261.24. All metals at TK-55-3 were below detection limits or were detected at concentrations below the regulatory limits specified in Table 1 of 40 CFR 261.24.

<u>Tanks 322 and 323</u> - The sample collected from the oily liquid pooled in the containment area of Tanks 322 and 323 (TK-322-1) did not contain any VOCs at concentrations exceeding detection limits which were all below the regulatory limits specified in Table 1 of 40 CFR 261.24.

<u>Tank 29</u> - The sample collected from the liquid pooled in the containment area of Tank 29 (TK-29-B1) contained benzene at a concentration of 1.10 mg/L, which exceeds the regulatory limit specified in Table 1 of 40 CFR 261.24. No other VOCs were detected, and detection limits were below the regulatory limits specified in Table 1 of 40 CFR 261.24.

<u>Junction Box 38 Sump</u> - The liquid sample (S-38-1) collected from the Junction Box 38 Sump contained benzene at a concentration of 0.38 mg/L. This concentration is less than the regulatory limit for benzene, as specified in Table 1 of 40 CFR 261.24. No other VOCs were detected, and detection limits were below the regulatory limits specified in Table 1 of 40 CFR 261.24.

<u>Desalter Tank</u> - The wastewater sample collected from the Desalter Tank (DES-1) contained benzene at a concentration of 6.6 mg/L, which exceeds the regulatory limit specified in Table 1 of 40 CFR 261.24. No other VOCs were detected, and detection limits were below the regulatory limits specified in Table 1 of 40 CFR 261.24.

The sample collected from the emulsion ("rag") layer within the tank (DES-2) contained benzene at a concentration of 3.60 mg/L, which exceeds the regulatory limit specified in Table 1 of 40 CFR 261.24. No other VOCs were detected, and detection limits were below the regulatory limits specified in Table 1 of 40 CFR 261.24.

The sample collected from the oil stream within the Desalter Tank (DES-3) contained benzene (1,490 mg/l), chlorobenzene (62 mg/l), 1,2-dichloroethane (25 mg/l) and methyl ethyl ketone (305 mg/l). The concentrations of benzene, 2-dichloroethane and methyl ethyl ketone exceed the regulatory limits specified in Table 1 of 40 CFR 261.24. In addition, due to matrix interference effects, although not detected by the laboratory, quantitation limits for carbon tetrachloride, 1,1-dichloroethene, tetrachlorethene, trichloroethene and vinyl chloride exceeded the regulatory limits specified in Table 1 of 40 CFR 261.24.

<u>Ouality Control Samples</u> - No VOCs were detected in either of the trip blanks (TB-1 and TB-2) collected during the sampling inspection. Methylene chloride was detected at 6.4 ug/l in the field blank (FB-1). No other VOCs were detected in FB-1. Methylene chloride is a common laboratory artifact, but not a TCLP target compound. Therefore, no action was required.

A.) Arsenic and selenium were detected in FB-1 and the prep blank. Arsenic was not detected in any field samples so no qualifies were needed. The reported selenium concentrations were greater than five times the highest blank concentration in all fields samples except TK-55-3, for which the selenium result was qualified as a non-detect. However, all reported selenium results are below the regulatory limit specified in Table 1 of 40 CFR 261.24, so there is no known impact on the useability of the data.

TABLE 2
VOLATILE ORGANIC ANALYTICAL BLANK DATA (Page 1 of 2)

A.T. Kearney Sample Number	TB-1	TB-2	FB-1
Remarks	Trip Blank	Trip Blank	Field Blank
Matrix	D.I. Water	D.I. Water	D.I. Water
Volatile Organic Compounds	ug/l	ug/l	ug/i
Chloromethane	10 U	10 U	10 U
Bromomethane	10 U	10 U	10 U
Vinyl chloride	2 U	2 U	2 U
Chloroethane	10 U	10 U	10 U
Methylene chloride	5 U	5 U	6.4
Acetone	100 U	100 U	100 U
Carbon disulfide	5 U	5 U	5 U
1,1-Dichloroethene	. 5 U	5 U	5 U
1,1-Dichloroethane	5 U	5 U	5 U
cis-1,2-Dichloroethene	5 U	5 U	5 U
trans-1,2-Dichloroethene	5 U	5 U	5 U
Chloroform	5 U	5 U	5 U
1,2-Dichloroethane	5 U	5 U	5 U
2-Butanone	50 U	50 U	50 U
1,1,1-Trichloroethane	5 U	5 U	5 U
Carbon tetrachloride	5 U	5 U	5 U
Vinyl acetate	50 U	50 U	50 U
Bromodichloromethane	5 U	5 U	5 U
1,2-Dichloropropane	5 U	5 U	5 U
cis-1,3-Dichloropropene	5 U	5 U	5 U
Trichloroethene	5 U	5 U	5 U
Chlorodibromomethane	5 U	5 U	5 U
1,1,2-Trichloroethane	5 U	5 U	5 U
Benzene	5 U	5 U	5 U

TABLE 2
VOLATILE ORGANIC ANALYTICAL BLANK DATA (Page 2 of 2)

A.T. Kearney Sample Number	TB-1	TB-2	FB-1
Remarks	Trip Blank	Trip Blank	Trip Blank
Matrix	D.I.water	D.I. water	D.I.water
Volatile Organic Compounds	ug/l	ug/l	ug/I
trans-1,3-Dichloropropane	5 U	5 U	.5 U
Bromoform	5 U	5 U	5 U
2-Chloroethylvinyl ether	10 U	10 U	10 U
4-Methyl-2-pentanone	50 U	50 U	50 U
2-Hexanone	50 U	50 U	50 U
Tetrachloroethene	5 U	5 U	5 U
Toluene	5 U	5 U	. 5 U
1,1,2,2-Tetrachloroethane	5 U	5 U	5 U
Chlorobenzene	5 U	5 U	5 U
Ethylbenzene	5 U	5 U	5 U
Styrene	5 U	5 U	. 5 U
o-Xylene	5 U	5 U	5 U
m,p-Xylene	5 U	5 U	5 U

TABLE 3
TCLP VOLATILE ORGANIC ANALYTICAL DATA SUMMARY (Page 1 of 2)

A.T. Kearney Sample Number	0P-1	OP-2	TK-29-B1	TK-55-1	TK-55-2	TK-55-3	TK-59-1
Remarks	Diluted 1:100	Diluted 1:50	Diluted 1:50	Diluted 1:20	Diluted 1:20	Diluted 1:20	Diluted 1:20
Matrix	Waste	Waste	Waste	Waste	Waste	Waste	Waste
TCLP Volatile Organic Compounds	mg/l	l/gm	I/Bm	l/gm	l/gm	mg/l	l/gm
Benzene	104*	*6L	1.1	0.10 U	0.10 U	0.14	4.9
Carbon tetrachloride	0.5 U	0.25 U	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
Chlorobenzene	1.2	0.40	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
Chloroform	0.5 U	0.85	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
1,2-Dichloroethane	2.5	1.30	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
1,1-Dichloroethene	0.5 U	0.25 U	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
Methyl ethyl ketone	5.0 U	2.5 U	2.5 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	0.5 U	0.25 U	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
Trichloroethene	0.5 U	0.25 U	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U
Vinyl chloride	0.5 U	0.25 U	0.25 U	0.10 U	0.10 U	0.10 U	0.10 U

\* Sample diluted at 1:1000 for benzene analysis

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TCLP VOLATILE ORGANIC ANALYTICAL DATA SUMMARY (Page 2 of 2) TABLE 3

	ICLF VC	LATILE OKOA	NIC AINALLI III	AL DATA SUM	ICLF VOLATILE ORGANIC ANALT HEAL DATA SOMMANT (1 age 2 of 2)	(77)	
A.T. Kearney Sample Number	TK-59-2	TK-59-3	TK-322-1	DES-1	DES-2	DES-3	S38-1
Remarks	Diluted 1:20	Diluted 1:20	Diluted 1:20	Diluted 1:20	Diluted 1:50	Diluted 1:1000	Diluted 1:20
Matrix	waste	waste	waste	waste	waste	waste	waste
TCLP Volatile Organic Compounds	mg/l	mg/l	l/gm	l/gm	mg/l	l/gm	mg/l
Benzene	4.7	0.10 U	0.10 U	*9*9	3.6	1490**	0.38
Carbon tetrachloride	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	5.0 U	0.10 U
Chlorobenzene	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	62	0.10 U
Chloroform	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	5.0 U	0.10 U
1,2-Dichloroethane	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	25	0.10 U
1,1-Dichloroethene	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	5.0 U	0.10 U
Methyl ethyl ketone	1.0 U	1.0 U	1.0 U	1.0 U	2.5 U	305**	1.0 U
Tetrachloroethene	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	5.0 U	0.10 U
Trichloroethene	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	5.0 U	0.10 U
Vinyl chloride	0.10 U	0.10 U	0.10 U	0.10 U	0.25 U	5.0 U	0.10 U
The state of the s							

\*Sample diluted at 1:100 for Benzene analysis

<sup>\*\*</sup>Sample diluted at 1:5000 for Benzene and Methyl ethyl ketone analysis

# TABLE 4 INORGANIC ANALYTICAL RESULTS SUMMARY

	A.T. Kearney Sample Number	FB-1	TK-55-1	TK-55-2	TK-55-3	TK-59-1	TK-59-2	TK-59-3
	Remarks	Field Blank*						
	Matrix	D.I. Water	Waste	Waste	Waste	Waste	Waste	Waste
	TCLP Metals	I/Bn	l/gu	l/gn	l/gu	l/gu	l/Bn	l/gn
000	Arsenic	1.6	50 U	50 U	20 U	50 U	50 U	50 U
00000	Barium	3.0 U	491	385	100 U	107	119	100 U
Ö	Cadmium	1.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U
0,0	Chromium	2.0 U	74.7	2'6	5.0 U	5.0 U	9.9	6
9	Lead	50 U	59.1	50 U	50 U	50 U	50 U	50 U
0	Mercury	0.10 U	0.61	0.50 U	0.50 U	0.50 U	4.8	0.50 U
of the second	Selenium	3.6	20.2	20.0	U 7.01	57.2	57.5	18.2
	Silver	2.0 U	7.7	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
	,							

\*Analyzed for Total Metals

## APPENDIX A

## PHOTOGRAPHIC LOG



Photo No.: 1 Date: 07/28/97 Time: 1047 Direction: WNW

Description:

Close view of sample location TK-59-1 at Tank 59. Note the spigot at the base of the piping, which was used to collect waste sample (TK-59-1) and duplicate sample (TK-59-2), directly into sampling containers. Tank 59 is a wastewater storage tank located in the southeast portion of the facility.



Photo No.: 2 Date: 07/28/97

Time: 1048 Direction: NW

Description:

View of sample location TK-59-3, east of Tank 59. TK-59-3 was collected from the sump-like pool in the foreground of the photograph. The "Tank 59 Sump" denoted in the facility diagrams is shown in the background portion of the photograph.

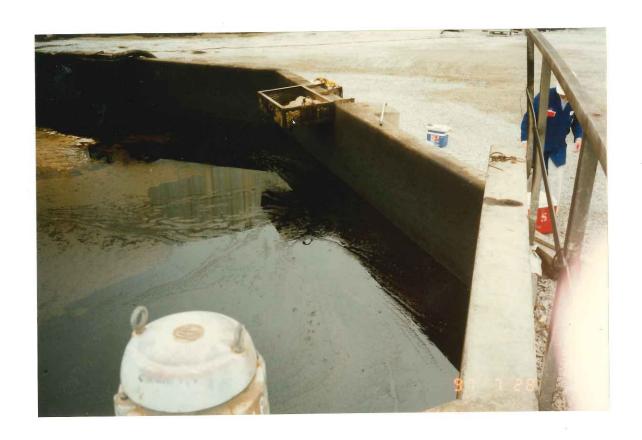


Photo No.: 3 Date: 07/28/97 Time: 1130 Direction: NW

Description:

View of the Overflow Pit, where samples OP-1 and OP-2 were collected. The samples were collected using an extension pole and sampling beaker, along the concrete wall on the right side of the photograph.



Photo No.: 4 Date: 07/28/97 Time: 1130 Direction: WNW

Description:

Expanded view of Overflow Pit contents. Note the heavy, black oily

material within this unit.



Photo No.: 5 Date: 07/28/97 Time: 1215 Direction: W

Description:

View of liquid/spill area located within the containment area associated with Tank 55. Samples TK-55-1, TK-55-2 and TK-55-3 were collected from the pooled liquid and black residue shown on the left side of the photograph.



Photo No.: 6 Date: 07/28/97 Time: 1215 Direction: E

Description:

Close view of a liquid/spill area located within the containment area associated with Tank 55. This area is approximately 30-40 feet east of the area where TK-55-1, TK-55-2 and TK-55-3 were collected.



Photo No.: 7 Date: 07/28/97 Time: 1300 Direction: W

Description:

Expanded view of the northern portion of the Tank 55 containment area. The dumpsters were used to contain soils and gravels collected from contaminated material cleanup within the Tank 55 area and reportedly will be disposed off-site.



Photo No.: 8 Date: 07/28/97 Time: 1430 Direction: SE

Description:

Close view of the Desalter Tank wastewater effluent piping and the

collection location for sample DES-1.



Photo No.: 9 Date: 07/28/97 Time: 1433 Direction: SW

Description:

Close view of Desalter Tank effluent piping for bi-phasic material transfer. The piping was used to collect both the emulsion (rag layer) and the oil phase contents of the tank, designated as samples DES-2 and DES-3, respectively.



Photo No.: 10 Date: 07/28/97 Time: 1447 Direction: S

Description:

Expanded view of the sample collection location at Tank 322/323 area (TK-322-1). The sample was collected from oily material located underneath the piping at the base of the photograph.



Photo No.: 11 Date: 07/28/97 Time: 1515 Direction: W

Description:

Close view of the valve at the base of Tank 29, at the location where sample TK-29-B1 was collected. Note the oil sheen on the liquid on ground

surface.



Photo No.: 12 Date: 07/28/97 Time: 1610 Direction: WSW

Description:

View of the cover of Sump 38. Sample S-38-1 was collected through an access point within the cover. The unit is a subgrade liquid collection and transfer sump.

APPENDIX B

FIELD LOG

NAME LOB LOWING
COMPANY ATT REPAYING

IF FOUND PLEASE RETURN TO:

PROJECT NAME CLARK (CRANINGS

PROJECT NUMBER (\$200 / Sos-626-01-04

CHEW EOR YOUNG STONES KEENING

CITY CHILAGO STATETE ZIP GOOD

PHONE 312 723-6237

STREET 222 WEST ADAMS

\*BATE 7 28 1 BOOK # LOF 2

WEATHER SONNY "75"

FIELD BOOK
16 PAGE
8 LEAVES
50% RAG

Reorder part # 101650 Phone # 800-241-6401

## CURVE FORMULAS

Chord def. = $\frac{\text{chord}^2}{R}$	No. chords = $\frac{I}{D}$	Tan. def. = } chord def.
R = T cot. } I	$R = \frac{50}{\sin 4D}$ $E = R \text{ ex. sec } 1$	E = T tan   I
T = R tan i I	$Sin, \frac{1}{2}D = \frac{50}{R}$	Sin. & D = 50 tan 1 I

The square of any distance, divided by twice the radius, will equal the distance from tangent to curve, very nearly.

To find angle for a given distance and deflection.

Rule 1. Multiply the given distance by .01745 (def. for 1° for 1 ft.) and divide given deflection by the product.

Rule 2. Multiply given deflection by 57.3, and divide the product by given distance.

the given distance.

To find deflection for a given angle and distance. Multiply the angle by .or745, and the product by the distance.

## GENERAL DATA

KIGHT ANGLE TRIANGLES. Square the altitude, divide by twice the base. Add quotient to base for hypotenuse.

Given Base 100, Alt. 10,10\*+200=.5. 100+.5=100.5 hyp.

Given Hyp. 100, Alt. 25.25<sup>1</sup> ÷ 200 = 3.125. 100 - 3.125 = 96.875 = Base. Error in first example, .002; in last, .045.

To find Tons of Rail in one mile of track: multiply weight per yard by 11, and divide by 7.

LEVELING. The correction for curvature and refraction, in feet and decimals of feet is equal to 0.574 d², where d is the distance in miles. The correction for curvature alone is closely, \{ \frac{3}{4}d^2\). The combined correction is negative.

PROBABLE ERROR. If  $d_1, d_2, d_3$ , etc. are the discrepancies of various results from the mean, and if  $\Sigma d^2$ —the sum of the squares of these differences and n=the mapper of observations, then the probable error of the

 $mean = \pm 0.6745 \sqrt{\frac{\Sigma d^3}{n(n-1)}}$ 

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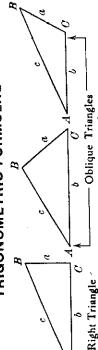
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# TRIGONOMETRIC FORMULAS



For Angle A,  $\sin = \frac{a}{c}$ ,  $\cos = \frac{b}{c}$ ,  $\tan = \frac{a}{h}$ ,  $\cot = \frac{b}{a}$ ,  $\sec = \frac{c}{h}$ ,  $\csc = \frac{c}{a}$ Solution of Right Triangles

 $\tan A = \frac{a}{b} = \cot B, c = \sqrt{a^2 + b^2} = a\sqrt{1 + \frac{b^2}{a^2}}$ Required A, B ,c

 $\sin A = \frac{a}{c} = \cos B, b = \sqrt{(c+a)(c-a)} = c\sqrt{1 - \frac{ca^2}{c^2}}$  $B = 90^{\circ} - A$ ,  $a = c \sin A$ ,  $b = c \cos A$  $B = 90^{\circ} - .4$ ,  $h = a \cot A$ ,  $c = \frac{a}{\sin A}$ C06 A  $B = 90^{\circ} - A$ , a = b tan A, c = -1, 13, 11 B, b, c Β, α, c B, a, h

 $\sin B = \frac{h \sin A}{a}, C = 180^{\circ} - (A + B), c = \frac{a \sin C}{A}$ a sin C  $b = \frac{a \sin B}{\sin A}$ ,  $C = 180^{\circ} - (A + B)$ ,  $c = \frac{1}{2}$ Solution of Oblique Triangles Given Required A, B,  $a \mid b$ , c,  $C \mid$ B, c, C A, a, b

 $A + B = 180^{\circ} - C_1 \tan \frac{1}{2} (A - B) = \frac{(a - b) \tan \frac{1}{2} (A + B)}{(a - b) \tan \frac{1}{2} (A + B)}$ (x-b)(x-c) $c = \frac{a \sin C}{a \sin C}$ sin A  $A = \frac{a+b+c}{c}$ ,  $\sin \frac{1}{2}A = \sqrt{\frac{a+b+c}{c}}$ A, B, c A, B, C a, b, C a, b, c

 $\sin \frac{1}{2}B = \sqrt{\frac{(3-a)(3-c)}{a}}, C=180^{\circ}-(.4+B)$  $3 = \frac{u+b+c}{c}$ , area =  $\sqrt{s(s-a)(s-b)(s-c)}$ a² sin B sin C 2 sin A area = b c sin A A, B, C, a Area Area A, b, c Area a, b, c

REDUCTION TO HORIZONTAL

When the rise is known, the horizontal distance is approximately the slope distance less the square of the rise divided by twice the slope distance. Thus: rise=14 ft. = 302.8 -0.32 - 302.28 ft. slope distance -302.8 ft. Horizontal distance  $=302.6 - \frac{12 - 12}{2 \times 302.6}$ 

veh. Angle Slope distance

Horizontal distance

### SITE-SPECIFIC SAMPLING AND ANALYSIS PLAN WASTE SAMPLING

#### Clark Refining and Marketing, Inc. Blue Island, Illinois EPA ID NO. ILD005109822

The following constitutes the Site-Specific Sampling and Analysis Plan (SAP) for waste sampling to be performed at the Clark Refining and Marketing, Inc. (Clark) facility in Blue Island, Illinois. The sampling activities will be conducted on July 28, 1997.

This SAP will be used in conjunction with A.T. Kearney's, U.S. EPA-approved Region 5 Generic Quality Assurance Project Plan (QAPP) for Sampling Operations, dated January 1995. The A.T. Kearney Sampling Team has selected Interteck Testing Services of Richardson, Texas to perform the analyses required under this SAP. Interteck Testing Services is a Kearney Team subcontractor.

#### Purpose and Objective

This SAP has been prepared to allow for the collection and analysis of waste samples at the Clark site. The waste samples will be collected from various locations throughout the facility, as directed by Mr. Allen Wojtas, the U.S. EPA Region 5 Technical Contact for this sampling event. The samples will be analyzed by Interteck Testing Services using the Toxicity Characteristics Leaching Procedure (TCLP) for volatile organic compounds (VOCs) and metals, and pH to aid in determining if the materials can potentially be classified as toxic hazardous wastes.

#### **Background Information**

Clark operates an oil refinery that processes up to 70,000 barrels of crude oil per day. The principal products include gasoline, liquid petroleum gas, heating fuel, jet fuel, diesel fuel and asphalt. The site is located at 13100 S. Kedzie Avenue, Blue Island, Illinois, approximately 15 miles south of downtown Chicago. Pollution control, and waste generation and management operations are regulated by U.S. EPA and Illinois EPA (IEPA) environmental permits and regulations.

Several processes are know to generate characteristic and/or listed hazardous waste at the Clark facility. These processes and associated waste codes include, but are not limited to, crude distillation (D001, D018), fluid catalytic cracking (D002), HF alkylation (D002), hydrocracking (D001, D003), catalyst regeneration (D001), wastewater treatment and collection (D018, F037, F038, K048, K049, K051) and miscellaneous smaller processes (primarily D001, D002, D008, D018).

polypropylene beaker attached to a handle. The resulting sample will be analyzed for TCLP VOCs.

#### Tank 59 Area Sampling

The area surrounding the Tank 59 sump will be visually inspected to locate areas of spillage of petroleum materials. If oily material is located in the area, up to two field samples will be obtained dependent upon the phases of spilled material present. Sample aliquots of spilled liquid phase waste will be obtained either directly into the appropriate sample containers or, if necessary, by using a disposable polypropylene beaker. The method of sample collection will be determined based on the amount and location of the spilled material. If solid or sludge-like spilled material is also found, sample aliquots of these solids will also be obtained. The solid materials will be transferred directly into appropriate sample containers using a stainless steel spoon. The resulting samples will be analyzed for TCLP VOCs and TCLP metals.

In addition, one field sample will be obtained from the influent sample tap on Tank 59. The sample aliquots will be obtained by filling the appropriate sample containers directly from the valve over a bucket to contain any spillage. The resulting sample will be analyzed for TCLP VOCs and TCLP metals.

The overflow pit adjacent to the Tank 59 sump area will be visually inspected to locate areas of spillage of petroleum materials. If oily material is located in the area, up to two field samples will be obtained dependent upon the phases of spilled material present. Sample aliquots of spilled liquid and/or solid phase wastes will most likely be obtained using a disposable polypropylene beaker attached to a handle. The resulting samples will be analyzed for TCLP VOCs.

For the purposes of determining appropriate QC samples, the liquid spilled materials samples and tap samples obtained in the Tank 59 area will be considered to be of the same matrix, and solid spilled materials samples of a second matrix. Additional discussion of the collection of QC samples is provided below.

#### Tank 55 Outfall Area

The area directly beneath the iron pipe attached to Tank 55 which discharges to the associated dike will be visually inspected to locate areas of spillage of petroleum materials. If oily material is located in the area, up to two field samples will be obtained dependent upon the phases of spilled material present. Sample aliquots of spilled liquid phase waste will be obtained either directly into the appropriate sample container or, if necessary, by using a disposable polypropylene beaker. The method of sample collection will be determined based on the amount and location of the spilled material. If solid or sludge-like spilled material is also found, sample aliquots of these solids will also be obtained. The solid materials will be transferred directly into appropriate sample containers using a stainless steel spoon. The resulting samples will be analyzed for TCLP VOCs and TCLP metals.

A field blank consisting of deionized water, will be obtained and analyzed for VOCs and metals. A trip blank will be included in each shipping cooler containing sample aliquots to be analyzed for VOCs.

All quality control samples will be collected in accordance with the U.S. EPA-approved A.T. Kearney Generic QAPP.

#### Sample Collection and Data Record

The samples collected by A.T. Kearney will remain in the custody of the A.T. Kearney field personnel until relinquished for shipment to the analytical laboratory. The sample bottles will be appropriately labeled (label affixed directly on the face of the bottle) and tagged with sample tags. A chain-of-custody (COC) form will accompany the samples from the point of origin to the analytical laboratory. The samples will be collected in containers specified in Section 6 of the U.S. EPA approved A.T. Kearney Generic QAPP. This section also identifies preservation techniques. All samples will be collected in "certified-clean" sample containers obtained from the laboratory or an analytical supply vendor.

In addition, A.T. Kearney will be equipped with sufficient appropriate sample containers and labels to provide facility representatives with split samples from each location to be sampled during this event.

#### Analytical Requirements

The samples will be analyzed for the parameters specified under each sampling area above. TCLP VOCs analysis will be performed using the TCLP (SW-846 Method 1311) and SW-846 Method 8240. The TCLP metals analysis will be performed using the TCLP (SW-846 Method 1311) and the SW-846 Method 6010/7000 Series. The metals to be analyzed for are arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver. The analytical and QA/QC requirements for the laboratory are outlined in the U.S. EPA-approved A.T. Kearney Generic QAPP.

All samples will be shipped via overnight carrier in coolers to Interteck Testing Services (1089 East Collins Boulevard, Richardson, Texas, Attention: Sample Control).

#### Data Validation

Analytical data will be generated by the subcontractor laboratory and provided to A.T. Kearney in conformance with CLP-like reporting protocols. The resulting data will undergo a 100 percent data validation effort by a member of the Kearney Team, independent of the sampling team. This validation will be in conformance with the Functional Guidelines for Organic and Inorganic Data Validation. Specific data package and data validation requirements are outlined in the U.S. EPA-approved A.T. Kearney Generic QAPP.

# SITE-SPECIFIC SAMPLING AND ANALYSIS PLAN WASTE SAMPLING CLARK REFINING AND MARKETING, INC., BLUE ISLAND, ILLINOIS EPA ID NO. ILD005109822 TASK 05 DELIVERABLE

#### Submitted to:

Mr. Brian Freeman
U.S. EPA Environmental Protection Agency
Region 5 DRE-8J
77 West Jackson Boulevard
Chicago, Illinois 60604

#### Submitted By:

A.T. Kearney, Inc. 222 West Adams Street Chicago, Illinois 60606

EPA Work Assignment No. Contract Number A.T. Kearney WAM ATK WAM Telephone No. EPA WAM EPA WAM Telephone No. R05020 68-W4-0006 Patricia Brown-Derocher (312) 223-7088 Brian Freeman (312) 353-2720

#### **ATKEARNEY**

A.T. Kearney, Inc 222 West Adams Street Chicago, Illinois 60606 312 648 0111 312 223 6200 Fax RZ2.R05020.01.ID.01.148

July 24, 1997

Mr.Brian Freeman U.S. Environmental Protection Agency Region 5 DRE-8J 77 West Jackson Boulevard Chicago, IL 60604

Reference:

EPA Contract No. 68-W4-0006; Work Assignment No. R05020; Clark

Refining and Marketing, Inc.; Blue Island, Illinois; EPA ID No.

ILD005109822; Site-Specific Field Sampling and Analysis Plan - Waste

Sampling; Task 05 Deliverable

Dear Mr. Freeman:

Please find enclosed A.T. Kearney's Site-Specific Sampling and Analysis Plan (SAP) for sampling activities proposed at the Clark Refining and Marketing, Inc. (Clark) facility in Blue Island, Illinois. This SAP has been prepared according to your July 15, 1997 TDM and conversations with Mr. Allen Wojtas, U.S. EPA Region 5, the Technical Contact for this activity. The SAP allows for the collection and analysis of waste samples at the Clark site. The samples will be collected and analyzed for various combinations of pH, TCLP volatile organic compounds (VOCs) and TCLP metals.

Please feel free to contact me or Mr. Robert Young, the A.T. Kearney Team Technical Lead at (312) 223-6237 if you have any questions.

Sincerely,

Patricia Brown-Derocher

Regional Manager

cc:

F. Norling, EPA Region 5 (w/out attachment)

A. Wojtas, EPA Region 5

W. Jordan

R. Young

A. Williams

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PORT CANONS

SITE INVESTIGATION REPORT

For

80s Tank Farm
Clark Oil and Refining Corporation
Blue Island, Illinois

Prepared for:

Clark Oil and Refining Corporation 131st Street and Kedzic Avenue Blue Island, Illinois 60406

Prepared by:

BLACK & VEATCH Waste Science, Inc.

September 1994



#### 1.0 Introduction

The purpose of this investigation was to characterize the subsurface conditions and define the nature of contamination (if any) coming from a buried benzene line running through the 80s Tank Farm at the Clark Oil and Refining Corporation Blue Island Refinery in Blue Island, Illinois. The scope of the investigation included a reconnaissance of the area, subsurface exploration, field and laboratory testing of soil and groundwater, and evaluation of the laboratory data from the site.

The investigation was conducted on June 30 and July 1, 1994. Black & Veatch Waste Science, Inc. starf directed the work. The Geoprobe® unit was provided by Burlington Environmental. Environmental Monitoring and Technologies, Inc. performed the laboratory analyses.

#### 1.1 Investigation Procedures

The investigation included collecting soil and groundwater samples at 7 locations in the 80s Tank Farm area. All samples were analyzed for the presence of benzene, ethylbenzene, toluene and xylene (BETX). Procedures outlined in the sampling plan for the investigation were followed to collect the samples. A copy of the sampling plan is provided in Appendix A.

#### 1.2 Site Location and Background

A description of the site, and the background of this project are provided in the sampling plan (Appendix A).

The geology of the Blue Island area consists of unconsolidated giacial and lake deposits over Silurian bedrock. The unconsolidated materials in the vicinity of the refinery range from 25 to 40 feet thick and are comprised of silt, clay, and sand. In general, the surface of the site is underlain by fill that consists of dark brown silt and clayey silt, or light gray and brown sand. The fill is encountered as deep as 9 feet below grade. Glacial tills comprised of tight silts and clays are encountered between 8 and 14 feet below grade. A highly organic peat layer occurs at some locations between the fill and glacial till. The peat layer ranges from approximately 4 inches to 2 feet thick. Sands and gravels with numerous limestone fragments are encountered beneath the glacial till (14 feet below grade). Bedrock, composed of Silurian dolomite is encountered between 25 and 40 feet below grade at the refinery.

Variable subsurface conditions combined with the presence of manmade structures creates complex hydrogeologic conditions at the site. Localized perched groundwater occurs throughout the region. Perched groundwater is encountered within a few feet of the ground surface in the vicinity of the site. The lateral extent of perched groundwater beneath the site is unknown. A shallow groundwater aquifer occurs in the unconsolidated soils beneath the glacial till. Water levels in the shallow aquifer occur between 12 and 30 feet below grade. Groundwater levels measured in three shallow aquifer wells (installed by USGS) at the refinery suggest a southeastern flow direction towards the Calumet Sag Channel. The hydrogeologic relationship between the Channel and the shallow aquifer is unknown.

Bedrock aquifers in the Blue Island area are used as a source of water for municipal wells. There are 3 municipal wells used by the City of Blue Island approximately 2 to 3 miles east of the refinery.

#### 1.3 Deviations from Proposed Plan

Field conditions necessitated some changes to the original sampling plan for the project. The original sampling plan called for three samples to be collected from each sampling location as follows:

- First fluid encountered.
- Subsurface soil sample collected at 3 feet below ground surface.
- Second fluid encountered.

The purpose of collecting a shallow and deep fluid sample was to determine if a light non-aqueous phase liquid (LNAPL) is present on the shallow water bearing unit in the area. If an LNAPL was encountered, the material would be sampled to evaluate its composition. Then, deeper groundwater beneath the LNAPL would be sampled to determine if a dissolved phase of the LNAPL was present in the groundwater. At most locations, the presence of an LNAPL was not detected, so it was not necessary to collect a deep groundwater sample. At these locations, only a shallow groundwater sample was collected since potential groundwater contamination at the site would most likely occur in the shallow portion of the uppermost water bearing unit. The Geoprobe® used at the site was not capable of collecting groundwater samples from discrete intervals since water could flow freely down the probe as the probe advanced; therefore, discrete groundwater samples from deeper intervals would

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LIGHT NON-AQUEOUS Phase Mouid

not necessarily be representative of conditions of that interval. In most cases, shallow and deep groundwater samples from the uppermost water bearing unit would have been redundant since the results would have been from the same groundwater.

Groundwater samples were not collected from two sampling locations (Locations 3 and 6) since groundwater was not encountered during probing. At these locations, a deeper soil sample was collected as a substitute for the groundwater sample. The deeper soil sample was collected to evaluate the vertical extent of soil contamination.

Another change created by field conditions was a modification in the method of preservation of groundwater samples. All groundwater samples were to be preserved with hydrochloric acid (HCl) and placed on ice immediately after collection. The first few groundwater samples reacted with the HCl when placed in the VOA vials preventing the sample from having zero headspace. The analytical laboratory was notified of the problem. The laboratory representative directed the field staff to collect the groundwater samples without HCl as a preservative. The absence of HCl preservative was noted with each sample so that laboratory holding times would not be exceeded.

An addition to the sampling plan was made at Location 1 where a temporary well was installed to determine if an LNAPL was present at this location. The procedures and results of this action are presented in Section 2.0.

#### 2.0 Analytical Results

This section summarizes observations and analytical results for each of the sampling locations. All analytical results are presented in Table 2-1. Appendix B contains analytical data returned from the laboratory.

#### Lecation 1

Location 1 is the only sampling location outside the 80s Tank Farm berm area. Location 1 is adjacent to the benzene line and approximately 55 feet west of the ladder post on the south side of the vapor sphere. The purpose of sampling at this location was to determine if soil or groundwater has been contaminated by the benzene line before the line enters the 80s Tank Farm. One shallow soil sample (2-4 feet bgs) and two groundwater samples were collected at Location 1. Soil in the sampling interval had a strong hydrocarbon odor, and PID measurements on the soil were as high as 200 ppm. Measurements with the Gastech indicated benzene concentrations in excess of 60 ppm. The concentration of benzene in the shallow soil sample was 122 ppm. The total BETX concentration in this sample was 124 ppm.

Groundwater was encounted during probing at Location 1 at approximately 2.5 feet bgs. A sample of this shallow groundwater had a benzene concentration of 500 ppm. The total BETX concentration in the shallow groundwater sample at Location 1 was 518 ppm. To determine if an LNAPL was present on the shallow groundwater surface, a 40 milliliter (mi) vial was partially filled and left undisturbed for approximately five minutes. At the end of five minutes, there appeared to be some phase separation of the liquid in the vial, with a 1 to 2 millimeter layer occurring on top of the liquid. The probe at Location 1 was extended to approximately 12 feet bgs and a 1 inch diameter PVC screen (with 0.01 inch slots) was placed in the hole. This screen was exposed to the formation from 2.5 to 11.5 feet bgs. This temporary well was left overnight in an attempt to observe whether an LNAPL was present at this location. The following day, a flexible piece of clear Tygon tubing was lowered into the temporary well and retrieved to observe the static fluid present. Phase separated liquids were not observed in the tube, but vapors were observed emanating from the well when it was first opened. A downhole measurement of the air in the well using a Gastech exceeded the filter limit of 60 ppm for benzene. Contents of the tube lowered into the well were poured into

Sample Identification and Analytical Summary 80s Tank Farm Investigation Clark Oil and Refining Corporation

		·					<del>,</del>							<del>-</del> T		
	6-Soil-Sh	5-8GW		5-Soil-Sh	4-SGW	4-Soil	3-Soil-Dp		3-Soil-Sh	2-SGW	2-Soil-Sh	1-DGW	7-30 W	1 ccw	1-Soil-Sh	Sample No.
t'arm.	Shallow soil from west- central portion of 80s Tank	Shallow groundwater from Location 5.	Tank Farm.	Shallow soil from	Shallow groundwater from Location 4.	Shallow soil from northeast portion of 80s Tank Farm.	Deep soil from Location 3 (9-10').	Farm.	Shallow soil from east- central portion of 80s Tank	Shallow groundwater from Location 2.	Shallow soil from southeast corner of 80s Tank Farm.	Deep groundwater from Location 1.	Location 1.	Shallow groundwater from	outside ank Farm.	Sample Location
	Soil	Groundwater		Soil	Groundwater	Soil	Soil		Soil	Groundwater	Soil	Groundwater		Groundwater	Soil	Matrix
	164	0.233		6.28	0.002	0.003	0.534	0.534	125	0.004	0.007	398		500	122	Benzene Concentration
	2.76	0.115		25.7	0.011	0.019		0.015	11.4	ND	Z	0.118		2.9	0.571	Ethylbenzene Concentration
	5.59	0.493		65.5	0.003	0.007	000	0.073	94 14	Z	UANA	0.00%	3	1.5	0.498	Toluene Concentration
	y./+	0.320	0 500	100	0,041		0.071	0.095	49.7			מס כ	n 547	14.2	1.53	Xylene Concentration
		188	0.905	23/74	2004	0.057	0.097	0.717		330	0.004	0.012	402	518	124	Total BETX

Table 2-1 (Continued)

Sample Identification and Analytical Summary 80s Tank Farm Investigation Clark Oil and Refining Corporation

				·					==1	
Notes:	7-SGW			7-Soil		6-Soil-Dp	Sample No.	•		
111:	Shallow groundwater from Location 7.	Tank Farm	northwest portion of 80s	Shallow soil from	(9-11).	from Location 6	Sample No.   Sample Location			
	Groundwater			Soil		Soil		Mairix		
	21.4			6.28		32.1		Concentration	Benzene	
	40.8			25.7		0.015		Concentration	Ethylbenzene	
	102			65.5		0.054		Concentration	Toluene	
	29.4			106		0.032		Concentration	Xylene	
	194			204		32.2	ن د د	ВЕТХ	Total	

All results are in parts per million (ppm).

The detection limit for each BETX compound was 0.001 ppm.

All shallow soil samples are from 2-4 foot interval. Intervals for deep soil samples are included in the table.

40 ml vials for groundwater sampling. This groundwater sample was labelled as 1-DGW (deep groundwater) and submitted for analysis. The temporary well materials were pulled from the hole and disposed of with the rest of the investigation derived waste. The hole was filled with bentonite. The concentration of benzene in 1-DGW was 398 ppm. The total BETX concentration in this sample was 402 ppm.

#### Location 2

Location 2 was placed in the southeast corner of the 80s Tank Farm in the cell containing Tank 85. One shallow soil sample and one shallow groundwater sample were collected from Location 2. The shallow soil sample was collected from the 2-4 foot bgs interval. Groundwater, which was encountered between 1 and 2 feet below the surface, was collected from the probe used to collect the soil sample. Soil at the surface and from the sampling interval was stained (black) and had a hydrocarbon odor. In addition, the groundwater sample was opaque.

The shallow soil sample at Location 2 (2-Soil-Sh) had a benzene concentration of 0.007 ppm. The total BETX concentration of the soil sample was 0.012 ppm. The shallow groundwater sample at Location 2 (2-SGW) had a benzene concentration of 0.004 ppm and a total BETX concentration of 0.004 ppm.

#### Location 3

Location 3 was placed in the east-central portion of the 80s Tank Farm in the cell containing Tank 83. The location was approximately 5 feet east of the benzene line. One shallow and one deep soil sample were collected from Location 3. Groundwater was not encountered while probing Location 3. Furthermore, groundwater did not accumulate in the probe after approximately 30 minutes. A deep soil sample (9-10 feet bgs) was collected at Location 3 as a substitute for a groundwater sample at this location. The chosen interval for the deep soil sample was determined based on subsurface conditions, to evaluate the vertical extent of observed contamination.

Soil from the shallow soil sample interval (2-4 feet bgs) was stained and had a hydrocarbon odor. PID measurements from the probe hole were as high as 160 ppm. Gastech measurements indicated benzene concentrations in excess of 60 ppm, xylene concentrations in excess of 250 ppm and toluene concentrations in excess of 100 ppm. At approximately 10 feet bgs, probing became more difficult as tight cohesive soils (silt and clay) were encountered. A stained layer of organic material with a

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hydrocarbon odor, was present immediately above these cohesive soils. The deep soil sample from Location 3 was collected from this transition interval.

The shallow soil sample from Location 3 (3-Soil-Sh) had a benzene concentration of 125 ppm, and a total BETX concentration of 220 ppm. The deep soil sample from Location 3 (3-Soil-Dp) had a benzene concentration of 0.534 ppm and a total BETX concentration of 0.717 ppm.

#### Location 4

Location 4 was placed in the northeast portion of the 80s Tank Farm in the cell containing Tank 81. Location 4 was close to the area where benzene was first encountered during a previous excavation (Appendix A). One shallow soil sample and one shallow groundwater sample were collected from this location. A deep groundwater sample was attempted at Location 4, but flowing silts and sands entered the perforations in the geoprobe and prevented the collection of a representative sample.

The shallow soil sample from Location 4 (4-Soil) had a benzene concentration of 0.003 ppm. The total BETX concentration in the sample was 0.097 ppm. The shallow groundwater sample from Location 4 (4-SGW) had a benzene concentration of 0.002 ppm and a total BETX concentration of 0.057 ppm. Concentrations of 5 ppm or less were detected by air monitoring instruments during probing. A tight cohesive unit (silt and clay) was encountered at approximately 10 feet bgs.

#### Location 5

Location 5 was placed in the southwest portion of the 80s Tank Farm in the cell containing Tank 86. One shallow soil sample and one shallow groundwater sample were collected from this location. The shallow soil sample (5-Soil-Sh) had a benzene concentration of 6.28 ppm and a total BETX concentration of 204 ppm. Ethylbenzene, toluene, and xylene were detected at concentrations of 25.7 ppm, 65.5 ppm, and 106 ppm, respectively. The shallow groundwater sample (5-SGW) had a benzene concentration of 0.233 ppm and a total BETX concentration of 0.995 ppm. Ethylbenzene, toluene, and xylene were detected in 5-SGW at concentrations of 0.115 ppm, 0.493 ppm and 0.598 ppm, respectively.

#### Location 6

Location 6 was placed in the west-central portion of the 80s Tank Farm in the cell containing Tank 84. The location was approximately 10 feet west of the benzene line. One shallow and one deep soil sample were collected from Location 6. As with Location 3, which was also in the central portion of the 80s Tank Farm, groundwater was not encountered while probing to a total depth of 15 feet bgs. Futhermroe, groundwater did not accumulate in the probe after an hour. A deep soil sample (9-11 feet bgs) was collected as a substitute for a groundwater sample at this location. The chosen interval for the deep soil sample was determined based on subsurface conditions to evaluate the vertical extent of any contamination detected.

Soil from the shallow soil sample interval at Location 6 (2-4 feet bgs) was stained (black) and had a hydrocarbon odor. PID measurements from retrieved soil were as high as 160 ppm. The probe met some resistance at approximately 11 feet bgs as it entered a tight cohesive layer of silt and clay. The deep soil sample at Location 6 (6-Soil-Dp) was collected from a visibly stained interval above the cohesive layer (9-9.5 feet bgs). Soil from the deep interval had a hydrocarbon odor, and PID measurements on the soil were 50 ppm.

The shallow soil sample (6-Soil-Sh) had a benzene concentration of 164 ppm and a total BETX concentration of 182 ppm. The deep soil sample (6-Soil-Dp) had a benzene concentration of 32.1 ppm and a total BETX concentration of 32.2 ppm.

#### Location 7

Location 7 was placed in the northwest portion of the 80s Tank Farm in the cell containing Tank 82. One shallow soil sample and one shallow groundwater sample were collected from Location 7. The shallow soil sample (7-Soil) had a benzene concentration of 6.28. The total BETX concentration was 204 ppm. The concentrations of ethylbenzene, toluene, and xylene in this shallow soil sample were 25.7 ppm, 65.5 ppm, and 106 ppm, respectively. The shallow groundwater sample at Location 7 (7-SGW) had a benzene concentration of 21.4 ppm and a total BETX concentration of 194 ppm. Ethylbenzene, toluene, and xylene were detected at concentrations of 40.8 ppm, 102 ppm, and 29.4 ppm, respectively, in the groundwater sample. In addition, a sheen was observed on the shallow groundwater sample from Location 7.

#### 3.0 Summary

The purpose of this investigation was to characterize the subsurface conditions and define the nature of contamination (if any) coming from a buried benzene line running through the 80s Tank Farm at the Clark Oil and Refining Corporation Blue Island Refinery. The investigation included a reconnaissance of the area, subsurface exploration, field and laboratory testing of soil and groundwater, and evaluation of the laboratory data from the site.

A total of 15 samples, 9 soil and 6 groundwater, were collected from 7 sampling locations as depicted on Figure 1-2 in Appendix A. The samples were collected using a Geoprobe®. Sample locations and results, visual observations made in the field, and monitoring results are presented in Section 2.0. All samples were analyzed for BETX compounds, with benzene being the primary contaminant of concern. Benzene was detected in all soil and groundwater samples.

The concentration of benzene in soil samples ranged from 0.003 ppm (the shallow soil sample from location 4) to 164 ppm (the shallows sample from Location 6). The highest concentrations of benzene in soil were present at locations 1, 3, and 6. Of all of the sample locations, these three sampling locations were closest to the buried benzene line. Location 1 was adjacent to the benzene line outside the bermed area for the 80s Tank Farm. Locations 3 and 6 both occur in the center cell of the bermed area, adjacent to the benzene line. Locations 2, 4, 5, and 7 were located close to the corners of the 80s Tank Farm to evaluate the extent of contamination within the bermed area. Benzene concentrations in soil samples from these locations were significantly lower than the concentrations found in soil samples from Locations 1, 3, and 6. BETX compounds other than benzene were also detected in most soil near the benzene line. Higher concentrations of ETX compounds occurred in soil at Locations 3, 5, 6, and 7. Concentrations of BETX compounds in soil were relatively low in the samples from Locations 2 and 4 which were located in the corners (northeast and southeast) of the 80s Tank Farm. Furthermore, soil contamination concentrations decreased with depth.

The concentration of benzene in groundwater ranged from 0.002 ppm (Location 4) to 500 ppm (Location 1). The highest concentrations of benzene in groundwater were detected in samples from Locations 1, 5, and 7. These locations also had relatively high levels of soil contamination. At Locations 3 and 6 (both in the center cell of the bermed area) groundwater did not accumulate during probing. BETX

compounds other than benzene were also detected in most groundwater samples (except Location 2). Location 1 had the highest levels of benzene contamination in the groundwater. However, the concentrations of the ETX compounds at this location were not in the same proportion when compared to other groundwater sampling results.

During probing, some characteristics of the subsurface conditions beneath the 80s Tank Farm were observed. Generally, groundwater was encountered at a depth of 2 to 3 feet below the ground surface, except at Locations 3 and 6 where groundwater did not accumulate. Stained soil was observed and a hydrocarbon odor was smelled, or detected with air monitoring instruments, at most locations. A relatively tight cohesive layer comprised of silt and clay was encountered at many locations between 9 and 11 feet bgs. Soils immediately above this cohesive layer were stained and had a hydrocarbon odor. This cohesive layer may be inhibiting downward migration of contamination. There is some evidence that an LNAPL may be present on the groundwater in the vicinity of Location 1; however, attempts to verify the presence of an LNAPL were inconclusive (see Section 2.0). In addition, a sheen was observed on the groundwater sample at Location 7.

40480.100

#### ENVIRONMENTAL PROTECTION AGENCY TECHNICAL ENFORCEMENT SUPPORT AT HAZARDOUS WASTE SITES

TES IV CONTRACT NO. 68-01-7351 WORK ASSIGNMENT NO. 201

RCRA FACILITY ASSESSMENT SAMPLING REPORT

CLARK OIL REFINERY BLUE ISLAND, ILLINOIS

EPA REGION V

JACOBS ENGINEERING GROUP, INC. PROJECT NO. 05-B201-00

REPORT PREPARED BY:

METCALF & EDDY, INC. 85 WEST ALGONQUIN ROAD, SUITE 500 ARLINGTON, HEIGHTS, IL 60005

JANUARY 1988

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#### SECTION 1 INTRODUCTION

#### 1.1 SCOPE OW WORK

Metcalf & Eddy, Incorporated (M&E) was issued a work assignment (WS #201) under the Technical Enforcement Support (TES) IV contract (EPA #68017351) to perform RCRA Facility Assessment (RFA) sampling at Clark Oil, Blue Island Refinery, Blue Island, Illinois. Due to the nature of the material handled onsite, this work assignment was issued to iedntify whether Clark Oil does or does not store or treat hazardous waste that is subject to RCRA permitting requirements.

#### 1.2 SITE BACKGROUND

Clark Oil and Refining Company is located in Blue Island, Illinois. It is a typical Oil Refinery with the convential process units. The facility is a generator of hazardous wastes only. According to information provided by the facility all the listed refinery waste streams are recycled to the coker unit, except the DAF sludge, which is sent out to a RCRA approved hazardous waste landfill. There are two storage tanks 35-l and 35-2. The solids formed in these tanks are shipped of site as KO52 wastes.

Clark Oil generates API separator sludge - K051, DAF float - K049, and leaded tank bottoms - K052. In the refinery all the above wastes end up in API separator and in their Wastewater Treatment System. The sludge generated in API separator is a listed hazardous waste, and any supernatant derived form their sludge thickening operation is also a hazardous waste due to "derived form" and "mixture" rules. A "pit" receives the API separator sludge, from where the supernatant is recycled to the API separator, and the sludge is pumped to a coker together with the oily skimmings of the API separator and pit.

Clark Oil claims that this acid is neutralized in the chemical process itself and therefore they do not generate or treat hazardous waste in the Alkyl unit. The facility has a spent caustic tank, and several slop oil tanks that Clark claims as a continuous operating tanks, not used for storage for more than 90 days, therefore not subject to RCRA permitting requirements.

#### 1.3 PROJECT APPROACH

The RFA work assignment consisted of three tasks. Each of these tasks are briefly described below:

#### TASK 1: Field Sampling

Surface water and sludge samples were collected at onsite locations to help characterize potential contamination the facility. As samples were collected, they were preserved according to U.S. EPA procedures which are described in the February 10, 1987 Quality Assurance Project Plan for the RFA project. All sampling locations were identified by the U.S. EPA Primary Contact, Lily Herskovits.

#### TASK 2: Sample Shipment

All samples collected were sent to designated Contract Laboratory Program (CLP) Laboratories. Samples collected for organics analysis were sent of S-Cubed in San Diego, California. Samples collected for EP Toxicity (Metals), Oil and Grease, TSS, and Sulfides analysis were sent to Centex Analytical Services in Salem, Virginia. Standard U.S. EPA sample handling protocols were followed for sample preservation, packaging and shipment.

#### TASK 3: Sampling Report

This written report is being submitted to the U.S. EPA upon completion of the sampling activities.

#### SECTION 2 FIELD ACTIVITIES

#### 2.1 INTRODUCTION

On December 2, 3 and 4, M&E representatives Bob Schoepke, Margaret Murdock and Gary Kruger collected a total of 18 onsite surface water samples at the Clark Oil, Blue Island Refinery, Blue Island, Illinois (See Table 1 and Figure 1). Access to the site and all sampling locations was obtained by the U.S. EPA Primary Contact Dr. Lily Herskovitz. All sampling depths and parameter analyses requested were finalized onsite by Dr. Herskovitz.

Prior to sampling, Mr. Tom Freily, of Clark Blue Island Refinery, requested split samples from all proposed sampling locations. Clark Oil also requested that M&E supply the sample bottles. M&E representatives informed Clark Oil that this would not be possible. The request for sample splitting was agreed to by Dr. Herskovitz of the U.S. EPA and M&E.

On the morning of December 2, 1987, John Bermbem, Tom Freily and Stafford Jacques of Clark Oil, Dr. Lily Herskovitz of the U.S. EPA and the M&E representatives met to discuss sampling plans and locations.

During the course of the meeting and a visual inspection of the facility, it was decided that water samples would be collected at the influent pipe to the API Separator, Tank 63, and the acid neutralization tank (also called the caustic tank). In addition, sludge samples would be collected form the bottom of the API separator and the bottom of the DAF sump. Composite samples from all locations would be collected three times daily on 12-2-87, 12-3-87, and 12-4-87.

Clark Oil requested that samples taken from tank 603 and the acid neutralization tank be collected by Clark Oil Operators for safety reasons. This request was agreed to by Dr. Herskovitz and the M&E representatives.

#### 2.2 FIELD INVESTIGATION

#### 2.2.1 Surface Water Samples

Three composite surface water samples were collected on December 2, 3 and 4 1987. Composite samples were collected form an influent pipe to the API separator, tank 63, and the acid neutralization tank.

API separator influent samples S72, S64, and S59 were collected by opening a valve on the influent pipe and filling the bottles directly from the valve. The bottles were filled to one-third capacity during each sampling event during the day. At the end of the day, the sample bottles would contain a daily composite sample. Samples for volatile organic analysis were filled at the end of each day from a daily composite sample.

A triple volume of surface water was collected at this location to be used as matrix spike and matrix spike duplicate (per instructions on U.S. EPA form 2075-7 (8-87)).

API separator return flow samples S60 was collected form Tank 63 on December 2, 1987. Samples S65 and S73 were collected the following two days from tank 65. The samples from both tanks were collected by directly filling the sample bottles form a valve on the tank. All API separator return flow samples were collected by a Clark Oil operator under M&T representative supervision. The samples were composited in the same manner as the API separator influent samples.

Caustic tank samples S61, S66, and S74 were collected by opening a valve and directly filling the sample bottles. All caustic tank were collected by a Clark Oil operator under M&E representative supervision. The samples were composited in the same manner as the API separator influent and return flow samples.

Field blanks S69, S70, and S71 were collected each day by directly filling the sample bottles with distilled water.

The water samples from the caustic tank and the field blanks were submitted for full HSL organics analysis only. The water samples from the API separator influent and return flow were submitted for full HSL organics, TSS, sulfides, oil and grease analysis were preserved with sulfuric acid to a pH  $\langle$  2. Samples for sulfide analysis were preserved with 40 drops of 2N zinc acetate and sodium hydroxide to a pH of  $\rangle$  9. All water samples were iced to  $4^{\circ}\text{C}$ .

#### 2.2.2 Sludge Samples

Two composite sludge samples were collected each day. The samples were composited in the same manner as the water samples.

The API separator sludge samples S62, S67, and S75 were collected from the bottom of the separator using a long-handled stainless steel ladle. The samples were poured directly form the ladle into the sample containers.

A double volume of sludge was collected on December 3, 1987 at this location to be used as a matrix spike (per instructions on U.S. EPA form 2075-7 (8-87)).

The DAF sump sludge samples S63, S68 and S76 were collected form the sump bottom in the same manner as the separator sludge samples. The last third of sample S63 was collected from the overhead conical bottom tank per Dr. Herskovitz request.

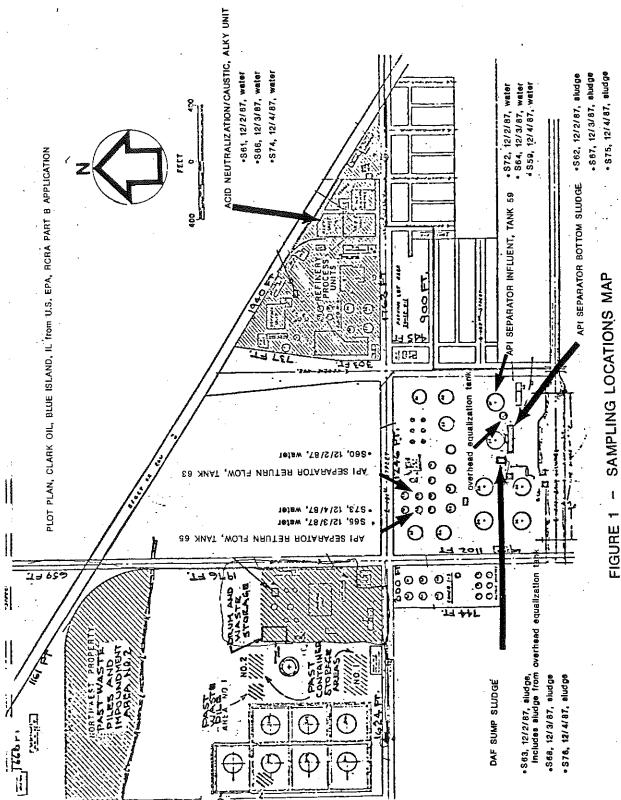
All sludge samples were submitted for EP - Toxicity metals analysis.

All equipment used in sample collection was decontaminated after each use. Equipment decontamination consisted of an Alconox soap wash, a distilled water rinse and an isopropanol rinse. All equipment was allowed to air dry.

#### TABLE 1

#### SAMPLE LOCATIONS

STATION	DESCRIPTION
<b>S</b> 72	API Separator Influent Water, 12-2-87
S64	API Separator Influent Water, 12-3-87
\$59	API Separator Influent Water, 12-4-87
S60	API Separator Return Flow Water, Tank 63, 12-2-87
S65	API Separator Return flow Water, Tank 65, 12-3-87
S73	API Separator Return Flow Water, Tank 65, 12-4-87
S61	Acid Neutralization/Caustic Tank Water, 12-2-87
S66 .	Acid Neutralization/Caustic Tank Water, 12-3-87
S74	Acid Neutralization/Caustic Tank Water, 12-4-87
S62	API Separator Bottom Sludge, 12-2-87
S67	API Separator Bottom Sludge, 12-4-87
S63	DAF Sump Sludge and Overhead Conical Bottom Tank, 12-2-87
S68	DAF Sump Sludge, 12-4-87
S76	DAF Sump Sludge, 12-4-87
S69	Field Blank, 12-2-87
S70	Field Blank, 12-3-87
S71	Field Blank, 12-4-87



ı FIGURE 1

## APPENDIX A Field Log Sheets

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator influent, 12-4-87, collected from API separator influent pipe.
Field Sample Number: S59
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected directly from a valve on the influent pipe. The bottles were filled to 1/3 capacity three times daily.
Date and Time of Collection: 12-4-87; 0920, 1200 and 1500
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representative. U.S. EPA samples shipped to CLP on 12-4-87. Requested analysis for HSL organics, VOAs, Oil and grease, sulfides, EP-toxicity and TSS. Oil and grease sample was preserved to pH $\langle$ 2.0 with H <sub>2</sub> SO <sub>4</sub> . Sulfide sample was preserved with 2N zinc acetate and NaOH to a pH $\rangle$ 9.0.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator return flow, 12-2-87 sample collected from tank 63.
Field Sample Number: S60
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample was collected from a valve in the middle of tank 63 by a Clark Oil operator under M&E supervision. The bottles were filled to 1/3 capacity three times daily. The composite sample was collected at 1145, 1430 and 1615.
Date and Time of Collection: 12-2-87, 1145, 1430 and 1615
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-2-87. Requested analysis for full HSL organics, oil and grease, TSS sulfides and EP toxicity (metals). The oil and grease sample was preserved with H <sub>2</sub> SO <sub>4</sub> to a pH ( 2. The sulfide sample was preserved with 2N zinc acetate and NaOH to a pH ) 9.  NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: Caustic tank, 12-2-87 sample collected from acid neutralization tank.
Field Sample Number: S61
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample was collected from a valve in the neutralization tank by the Clark Oil operator under M&E
supervision. The bottles were filled to 1/3 capacity three times
daily. The composite sample was collected at 1115, 1415 and
1605.
Date and Time of Collection: 12-2-87, 1115, 1415, 1605
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil
representatives. U.S. EPA samples shipped to CLP on 12-2-87.
requested analysis for full HSL organics.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator sludge, 12-2-87 sample collected from bottom of API separator.
Field Sample Number: S62
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample was collected from the bottom of the API separator using a long-handled stainless steel ladle.  The bottles were filled to 1/3 capacity three times daily. The composite sample was collected at 1120, 1430 and 1605.
Date and Time of Collection: 12-2-87, 1120, 1430 and 1605
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-2-87. Requested analysis for EP toxicity (metals).
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: DAF sump sludge, 12-2-87 sample collected from the bottom of the DAF sump.
Field Sample Number: S63
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected from the bottom of the DAF sump using a long-handled stainless steel ladle. The bottle was filled to 1/3 capacity three times daily. The sample was composited at 1125, 1435 and 1615.
Date and Time of Collection: 12-2-87, 1125, 1435 and 1615
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-2-87 requested analysis for EP toxicity (metals).
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator
influent, 12-3-87, sample collected from API separator influent
pipe.
Field Sample Number: S64
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
readed talk bottoms 1032.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected directly from a valve on the influent pipe. The sample bottles were filled to 1/3 capacity, three times daily. The composite sample was
collected at 0930, 1145 and 1510.
Date and Time of Collection: 12-3-87, 0930, 1145 and 1510
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-3-87.
Requested analysis for full HSL organics, oil and grease, TSS,
gulfides and FP Toxicity (metals). Oil and grease samples were
preserved with H <sub>2</sub> SO <sub>4</sub> to a pH of $\langle$ 2. The suffice sample was
preserved with 2N zinc acetate and NaOH to a pH > 9.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator return flow, 12-3-87 sample collected from tank 65.
Field Sample Number: S65
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample was collected from a valve in the middle of tank 65 by a Clark Oil operator under M&E supervision. The bottles were filled to 1/3 capacity three times daily. The composite sample was collected at 0950, 1205 and 1510.
Date and Time of Collection: 12-3-87, 0950, 1205 and 1510
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-3-87. Requested analysis for full HSL organics, oil and grease, TSS, sulfides and EP toxicity (metals). The oil and grease sample was preserved with $\rm H_2SO_4$ to a pH of $<$ 2.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: Caustic tank, 12-3-87. Sample collected from acid neutralization tank.
Field Sample Number: S66
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample was collected from a valve in the neutralization tank by a Clark Oil operator under M&E supervision. The bottles were filled to 1/3 capacity three times daily. The composite sample was collected at 0940, 1200 and 1520.
Date and Time of Collection: 12-3-87, 0940, 1200 and 1520
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-3-87.  Requested analysis for full HSL organics.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator sludge, 12-3-87. Sample collected from bottom of API separator.
Field Sample Number: S67
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample was collected from the bottom of The API separator using a long-handled stainless steel ladle. The bottle was filled to 1/3 capacity, three times daily. The composite sample was collected at 0940, 1150 and 1515.
Date and Time of Collection: 12-3-87, 0940, 1150 and 1515
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-3-87. Requested analysis for EP toxicity (metals).
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: DAF sump sludge, 12-3-87 sample collected from the bottom of the DAF sump.
Field Sample Number: S68
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected from the bottom of the DAF sump using a long-handled stainless steel ladle. The sample bottle was filled to 1/3 capacity, three times daily. The sample was composited at 0950, 1155 and 1520.
sample was composited at 0950, 1155 and 1520.
Date and Time of Collection: 12-3-87, 0950, 1155 and 1520
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-3-87.
Requested analysis for EP toxicity (metals).
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: Field blank collected near API separator.
Field Sample Number: S69
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Filled sample bottles directly from distilled water bottle.
Date and Time of Collection: 12-2-87, 1500
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-2-87.
Requested analysis for full HSL organics.  NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: Field Blank, 12-3-87, collected near the API separator.
Field Sample Number: S70
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and
leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Filled sample bottles directly from the distilled water bottle. The field blank was preserved in the same manner as the samples.
Date and Time of Collection: 12-3-87; 1000
Results of any Field Measurements Made:
Observations and Comments: This sample was not split with Clark Oil representatives. U.S. EPA samples were shipped to CLP labs on 12-3-87. Requested analysis for HSL organics and VOAs.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator influent, 12-2-87, collected from API separator influent pipe.
Field Sample Number: S71
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected directly from a value on the influent pipe. The bottles were filled to 1/3 capacity, three times daily. The composite sample was collected at 1115, 1420 and 1600.
Date and Time of Collection: 12-2-87, 1115, 1420 and 1600
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples were shipped to CLP labs on 12-2-87. Requested analysis for full HSL organics, oil and grease, sulfides, total suspended solids and EP toxicity. The oil and grease sample was preserved with H <sub>2</sub> SO <sub>4</sub> to a pH < 2. The sulfide sample was preserved with 2N zinc acetate and NaOH to a
<u>p</u> H ⟩ 9.
NAME (Printed): Robert Schoepke
Signature:

Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator influent, 12-2-87, collected from API separator influent pipe.
Field Sample Number: S72
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected directly from a value on the influent pipe. The bottles were filled to 1/3 capacity, three times daily. The composite sample was collected at 1115, 1420 and 1600.
Date and Time of Collection: 12-2-87, 1115, 1420 and 1600
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples were shipped to CLP labs on 12-2-87. Requested analysis for full HSL organics, oil and grease, sulfides, total suspended solids and EP toxicity. The oil and grease sample was preserved with $\rm H_2SO_4$ to a pH $<$ 2. The sulfide sample was preserved with 2N zinc acetate and NaOH to a pH $>$ 9.
NAME (Printed): Robert Schoepke Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator return flow, 12-4-87, collected at tank 65.
Field Sample Number: S73
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and
leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: The sample was collected directly from a valve on tank 65 by a Clark Oil operator under M&E supervision. The bottles were filled to 1/3 capacity three times daily.
Date and Time of Collection: 12-4-87; 0910, 1210 and 1500
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-4-87. Requested analysis for HSL organics, VOAs, Oil and grease.
Sulfides, EP-toxicity and TSS. Oil and grease sample was
presented to pH $\langle$ 2.0 with H <sub>2</sub> SO <sub>4</sub> . Sulfide samples was preserved with 2N zinc acetate and NaOH to a pH $\rangle$ 9.0.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: Caustic tank, 12-4-87 sample collected from acid neutralization tank.
Field Sample Number: S74
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and leaded tank bottoms - K052.
Teaded talk bottoms - ROSZ.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sample collected from a valve on the caustic tank by a Clark Oil operator under M&E supervision. The sample jars were filled to 1/3 capacity three times daily.
Date and Time of Collection: 12-4-87; 0925, 1200 and 1510
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-4-87. Requested analysis for HSL organics and VOAs.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: API separator sludge, 12-4-87, collected from the bottom of the API separator.
Field Sample Number: S75
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and
leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sludge sample was collected from the bottom of the API separator using a long-handled stainless steel ladle. The sample was poured directly into the sample jar. The jar was filled with 1/3 of its capacity three times daily.
Jar was fiffed with 1/3 of its capacity three times during.
Date and Time of Collection: 12-4-87; 0925, 1205 and 1505
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP on 12-4-97. Requested analysis for EP-toxicity.
NAME (Printed): Robert Schoepke
Signature:

Facility Name: Clark Oil, Blue Island Refinery
Facility Address: P.O. Box 297 Blue Island, IL 60406
Location and Description of Sampling Point: DAF sludge, 12-4-87, collected from the DAF sump.
Field Sample Number: S76
Purpose of Sampling: To determine if the return water to the API separator and the spent acid in the HF Alkylation unit are
hazardous wastes that require a RCRA permit.
Type of Waste: API separator sludge - K051, DAF float - K049 and
leaded tank bottoms - K052.
Process (if known) Producing Waste: Oil Refining
Suspected Composition, Including Concentrations (if known):
Sampling Methodology: Sludge sample was collected from the bottom of the sump with a long-handled stainless steel ladle.  The sample was poured directly into the sample jar. The jar was filled with 1/3 of its capacity three times daily.
Date and Time of Collection: 12-4-87; 0930, 1210 and 1510
Results of any Field Measurements Made:
Observations and Comments: Samples were split with Clark Oil representatives. U.S. EPA samples shipped to CLP labs on 12-4-87. Requested analysis for EP toxicity.
NAME (Printed): Robert Schoepke
Signature:

## APPENDIX B Chain of Custody Forms

ENVIR NTAL PROTECTION AGENCY
Office of Enforcement

230 South Dearborn Street Chicago, Illinois 60604 NON CHAIN OF CUSTODY RECORD

5-29402 5-29432 5-29408 5-28438 5-20414 5-110367 Romarks FEDERAL EXPERS ARbill#65074/1991 5-29413 5-39439 5-110374 5-110368 5-140333 5-29407 5-29437 5-39401 Low Concentradiens Received by: (Signatura) Received by: (Signature) 5-39440 Onafody Scals: 11679, 11650 5-29346 Case # 8624 4-29344 REMARKS 5-29347 52562-5 539431 Date / Time Date / Time EP 742 EP 742 CHU JY 井」して EP 743 EP 743 FP 734 EP 742 FF 734 E10735 FP 735 TWATE TO THE TRANSPORT Relinquished by: (Signature) Relinquished by: (Signeture) TO THE PROPERTY OF THE PARTY OF Sanarado Militada Date / Time X  $\times$ Distribution: White — Accompanles Shipment, Plnk — Coordinator Field Files; Yellow — Laboratory File XYOMIX 2X40ml 2X40mg 2x8002 API SEPECATOR RETURN FLW 2X40ML 2X8/OZ 2x40ml TAINERS 2×8000 2x800x 2×8/107 Ś Š. ö Received for Laboratory by: (Signature) Received by: (Signature) Received by: (Signature) API Seguator INFLUENT Margaret Murdol CLARK OIL & REFAMME アダダア STATION LCCATION : = てもつかだり 122-57 /70 Date / Time Date / Time Date / Time May U. Thungol PROJECT NAME а∧яэ COMP 573 12 12 18 18 18 X × X 0011 1810/21 009/ 48/15/61 Relinquished by: (Signature) TIME 0091 48/8/61 9191 ts2-21 CON TEST 21 Retinquished by: (Signature) Relinquished by: (Signature) 0091 48/6/61 9191 83-2-21 009125/6/61 5091 +87-21 SAMPLERS: (Signature) DATE なると Stort inse PROJ. NO. 88 IGO/ STA. NO. 572 573 260 573 572 572 560 250 561 561

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ENVIRON AL PROTECTION AGENCY
Office of Enforcement

230 South Dearborn Street

RE JN B

Romarks Federal Expuss airbill#650741793 SHIPPED to S-CUBER 11,20 1623 Chicago, Illinois 60604 5-110398 5-29343 5-29342 LOW Condendations CASE # 8624 Custody Selo: Hint Printing Received by: (Signature) Received by: (Signature) 5-110396 REMARKS Date / Time Date / Time EP739 EP 739 Relinquished by: (Signaura) Relinquished by: (Signeture) X CHAIN OF CUSTODY RECORD Date / Time × Distribution: White — Accompanies Shipment; Pink — Coordinator Field Files; Yellow — Laboratory File 2x40mc TAINERS 2x5007 CON Š. 6 Received for Laboratory by: (Signature) Date / Time | Received by: (Signature) Received by: (Signatura) Huyw. Hugof Mayaret Mudbers STATION LOCATION Story CLARK OIL & REFINING SIELD BLANK AAA SEE ENAPORE Ot1 12-2-2 Date / Time Date / Time PROJECT NAME 8AR5 COMP 572 43152 400 X Relinquished by: (Signature) Relinquished by: (Signature) Relinquished by: (Signeture) TIME 12-2-87 1500 12-2-57 1300 P. Schoolan SAMPLERS: (Signature) DATE BRILDI, NO. STA. NO. 269 869

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IL PROTECTION AGENCY Office of Enforcement ENVIRONA

230 South Dearborn Street

Case # 8624 Case # 8624 SAS # 3504-E REMARKS Chicago, Illinois 60604 MRB14# 1507417945 WALKIN BY QUESTEN SOUTE 11678 AND 11677 SHIPPPD to CENTEC ANALITICAL SERVICES wa m Received by: (Signature) Received by: (Signature) 1710 X Date / Time Date / Time 5-110377 5-110375 5-110370 5 - 110372 5-29406 5-29416 5-29412 5-29418 5-29410 5-29404 Remarks FED EX 松外 3/2/5/4 Relinquished by: (Signature) Relinquished by: (Signeture) CHAIN OF CUSTODY RECORD Date /Time Distribution: White — Accompanies Shipment; Pink — Coordinator Field Files; Yellow — Laboratory File 1 x 802 1x 802 TAINERS 1418 1 × 18 9 Received for Laboratory by: (Signeture) CLARKOIL AND RETINING Received by: (Signature) Received by: (Signature) API SEPACATOR RETURN FLOW How U. Kunga / R. S. March - Mayed Musbod API Separator SLUDGE SEMPATOR INFLUENT STATION LCCATION 12.2-87 17ED Date / Time Date / Time Date / Time AP PROJECT NAME BARD COMP 502 PLISA 1405 X 17/4/87 1600 X 1/1/87 1600 4 7/87 1660 X 17/2/37 1600 4 5 60 142/87 1650 X X 0591 18/2/11 7/82 1600 4 x 3191 1816/51 12/2/87 1600 Relinquished by: (Signature) Relinquished by: (Signature) STA, NO. | DATE | TIME Relinquished by: (Signatura) SAMPLERS: (Signature) 10958 PROJ. NO. 572 MPM 78/ELA GAZVION MPM 78/ELA GAZVION MPM 78/ELA GAZVION MPM 78/ELA GAZVION MPM 78/ELA GAZVION

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ENVIRON, AL PROTECTION AGENCY
Office of Enforcement

230 South Dearborn Street

SHIPPED to CRATER MARKATICAL SIGNICES Chicago, Illinois 60604 Romarks FED EX AIRBILL # 6507417976 Low Concentrations Date / Time | Received by: (Signature) Received by: (Signarum) CUSTO DY SPACE 11695, 11676 Sas# 3504-E REMARKS Cax # 8624 Date / Time 5-110369 5-29405 5-29417 5-29403 5-49415 5-29409 5-11037 5-29411 Relinquished by: (Signeture) Relinquished by: (Signature) MAM 12/8/80 CHAIN OF CUSTODY RECORD Date / Time .03 Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File 1 × 5002 / X 8002 X 1 X 8002 1X 8002 Zabr/ 1X802 /x802Z 1×800Z TAINERS CON-Š. Ô Received for Laboratory by: (Signeture) Separadon Retorn Flow Date / Time | Received by: (Signature) Received by: (Signature) API Sepanator INFLUENT 1 Margart Murboy ATSORNAPA INFINANT APE SOQUETOR SLUDGE STATION LCCATION -CLARK OIL + REFINING 1700 Date / Time Date / Time 12-2-27 Hans, Kury. 8ARD PROJECT NAME COMP X 0091 18/e/e/ X May 18/e/ci X SIMI USTETCI 14/69 /1005 X X 0091 religion X 3191 hajeles X 0091 12/2/E 0091 Lstek Relinquished by: (Signature) 009/48/6/2 Refinquished by: (Signature) Retinquished by: (Signatura) STA. NO. | DATE TIME SAMPLERS: ISignature 882601 PROJ. NO. Spinam 572 500 572 572 Sup

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ENVIRC TAL PROTECTION AGENCY
Office of Enforcement

230 South Dearborn Street

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SHIPPED tO CENTER ANALYTICAL SEAMON'S Chicago, Illinois 60604 Remarks FED EX MRBILL# 6507418013 Concendentions Received by: (Signature) Received by: (Signature) # 3544 REMARKS # 865 CUSTODY SPACE 1/670 LOW Ess Date / Time Date / Time 5-110382 0380 5-116383 5-110386 5-110393 5-110 388 5-110389 5-110394 5-110395 5-110387 5-11038 T Relinquished by: (Signature) Relinquished by: (Signature) MA 925 CHAIN OF CUSTODY RECORD Date /Time SERI Distribution: White — Accompanies Shipment; Pink — Coordinator Field Files; Yellow — Laboratory File 1×800z 1X/P 1 × 802 1×802 1 × 802 ×802 1 x 800; XDOX 1×12 TAINERS ĊŌŚ õ Ö 77 Received for Laboratory by: (Signature) Separator Intrumt Received by: (Signature) Received by: (Signature) API Sepanator Slurge 1 Maynet Muchoc, 881601 CLARKOIL AND REFININK API ROTURN FLOW STATION LOCATION > 12-3-87 1700 Date / Time Date / Time Seland Date / Time DAF API PROJECT NAME 8ARD COWb X 3131 1515 X 13/81/1510 X X 0151 18/s/r/ X desipalste 1510 1510 0151 18/2/01 2121 pxe/c/ 15/0 0/3/1/2/16/ 0151 1815 Relinquished by: (Signature) Refinquished by: (Signeture) Relinquished by: (Signature) TIME SAMPLERS: (Signatura) 12/2/9 13/2/67 13/8/1 DATE PROJ. NO. STA. NO. 5107 508 564 1,95 505 795

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230 South Dearborn Street Chicago, Illinois 60604

CHAIN OF CUSTODY RECORD

L PROTECTION AGENCY

**ENVIRON**,

Office of Enforcement

Remarks FED EX AIRBILL #6507418035 SHIPPED to S-CUBFD 5-29349 5-29434 LOW CONCENTRATIONS 84565-2 2-29436 ZKK62-5 6EE011-5 5-110384 5-29435 5-29433 1742-2 CUSTODY SEPTS:#11672, 11671 Date / Time Received by: (Signeture) Received by: (Signature) 5-110391 CUS # 8634 REMARKS 3-E011-5 002011-5-110385 5-110399 5-40390 Date / Time の上が井 FP 737 EP 736 EP 737 EP 736 FP 738 5P 758 FP 740 0 440 G SERIES OF THREE SHIMMENTS Relinquished by: (Signeture) Relinquished by: (Signature) SOLAMICS ं ने हैं जारी भागी × X Date /Time く × 2×40me 2×YOML 2×8001 218002 2x YOML ZKYOML TAINERS 2×860 2×50A Š Š. Ŗ Received for Laboratory by: (Signature) Date / Time Received by: (Signature) | Received by: (Signature) Hay J. Haye / Magaret Murdock CLARK OIL and REFINING SEP. RETURN FLOW APISER INFLUENT STATION LOCATION BLANK SECOND IN A CAUSTIC TANK 12-3-87 1700 Date / Time Date / Time ELELD API PROJECT NAME BARD COMP X Relinquished by: (Signature) Relinquished by: (Signature) Relinquished by: (Signature) TIME R. Schoople A. Schogola SAMPLERS: (Signature) 12-3-87 12-3-87 12-3-54 12-3-51 12-3-8-3 12-3-87 DATE 13.53 E58:-21 881601 PROJ. NO. STA. NO. 264 270 000 570 764 460 565 465

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Distribution: White — Accompanies Shipment; Pink — Coordinator Field Files; Yellow — Laboratory File

ENVIRC TAL PROTECTION AGENCY
Office of Enforcement

230 South Dearborn Street

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Law Consenstrations Chicago, Illinois 60604 912-5,05485-2 5-29450 6-29444 5-29419 5-29445 5-110359, 5-29447 5-27425,5-29443 5-805-2 YF208-2 Remarks F=D 13/4/1/8/14 # 65074/1932 8-110361/529448 austody spale: 11667 + 11668 Received by: (Signature) Received by: (Signeture) 2-29426 Caso # 8621 5-80573 REMARKS SHIPPED to S-CLUBD Date / Time Date / Time ったが E6134 EP734 60343 Ep 733 6073 EP743 rp 741 FPFHI 5 Relinquished by: (Signatura) Relinquished by: (Signature) X × × CHAIN OF CUSTODY RECORD × JUKL Date /Time × X × × × X Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File 0 2x 40m X X 204 x 5 5ER1E5 2x40ml 2×80cr TAINERS × 800 2×80kz 1 4 40016 CON ġ ů Received for Laboratory by: (Signature) Received by: (Signeture) Received by: (Signature) \* CAST SHIPINFUT IN A Pan U. Tanan / Mayart Muster CLARK OIL AND REFINING API SEP, RETURN FLOW NELUENT STATION LCCATION CAUSTIC TANK BIANK 12-4-87 1700 Date / Time Date / Time Date / Time FIEC D PROJECT NAME BARD X × 9MQ2 X 005  $\succ$ × X 0131 F8-4-51 X 0151 ES. X-21 X 005/18.6.21 0051 F8.4. 525018-27 Relinquished by: (Signatura) Relinquished by: (Signatura) 2.4.870835 TIME 005/ tx.4.21 Relinquished by: (Signatura) SAMPLERS: (Signature) P. Salvayle DATE 1.4.83 PROJ. NO. 88160 STA, NO. マナン 873 8 59 ht 5 474 125 723

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ENVIROI AL PROTECTION AGENCY
Office of Enforcement

230 South Dearborn Street

Chicago, Illinois 60604 Remarks FED EX HIRBILL # 45074/8007 Low Consendence SHIPPERS to CENTER ANALYTICAL SERVICES Received by: (Signature) austody seeds 11665 + 11666 Received by: (Signature) Our #8024 815# 3504-E 5-110363 5-29424 5- 110364 5-29423 5-29422 5- 110365 2-245 5- 110366 5-2917 5-29429 Date / Time Date / Time Refinquished by: (Signature) Relinquished by: (Signature) CHAIN OF CUSTODY RECORD Date /Time THREE. X Distribution: White - Accompanies Shipment; Pink - Coordinator Field Files; Yellow - Laboratory File 1 X 8002 X 1 X 800m TAINERS 1 x 800 = XBOZ ト ト ト 18002 1X802 IX I g IXIQ CON-X Ö. Р A SERIES OF Received for Laboratory by: (Signature) Received by: (Signatura) Date / Time | Received by: (Signature) CLARKOIL and REFINING SEP. RETURN FLOW 1. Share Mayart Athenbot -STATION LOCATION SLUDGE SEP. WELVENT \*LAST SHIPMENT IN 235 2-4-8-11-50 Date / Time API 8ARD PROJECT NAME COMP 12/4/87 1500 X 0/4/87 1500 005/181/200 1500 12/4/23 1500 12/4/84 1/505 1/4/87/500 DATE TIME 0/5/19/1/2 Relinquished by: (Signatura) 12/4/37/1500 Relinquished by: (Signature) 14/81/500 Relinquished by: (Signeture) SAMPLERS: (Signature) 12/4/87 109588 PROJ. NO. STA, NO. 573 559 559 553 545 533

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# APPENDIX C Organic Traffic Reports

	CITY, STATE: SITE SPILL ID: BUR ISLAND, IL  REGION NO: SAMPLING COMPANY @ V Metculf & Eddy						3398 Carmel Mtn Rd				SAMPLE DESCRIPTION (6) (ENTER IN BOX A) 4. SOIL 1. SURFACE WATER 5. SEDIMENT 2. GROUND WATER 6. OIL (SAS) 3. LEACHATE 7. WASTE (SAS)	
							E	CA CA CA CA CA CAINE WAL	ters_	TRIPLE VOLUME REQUIRED FOR MATRIX SPIKE/DUPLICATE AQUEOUS SAMPLE  SHIP MEDIUM AND HIGH CONCENTRATION SAMPLES IN PAINT CANS  SEE REVERSE FOR ADDITIONAL INSTRUCTIONS		
							SHI	2-2-87 END: IPPED: CAR NO: 65074	RIER: FE ®			
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SITE NAME: CLARKOIL AT	:. 5/- s	10		ATTN: ELAINE WALTERS					E VOLUME REQUIRED FOR MATRIX		
CITY, STATE:	SITE SE							SFIRE	ADDE LIGHTE AGGEOOG GARIT EE		
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CITY, STATE:		SITES		ᇟᆫ					SFIN	EDUFLICATE AQUEOUS SAMPLE
Blue Island,		Y					IG DATE: / ユ/3/,			MEDIUM AND HIGH CONCENTRATION PLES IN PAINT CANS
REGION NO: SAN	APLING	COMPA	NY	~ ⊦			12-3-87 END:			
Wetco SAMPLER: (NAME)		1.4	<del>Y</del> —	-	DATE	E SH	IPPED:CAR	RIER: FE 5		SEE REVERSE FOR ADDITIONAL INSTRUCTIONS
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EPA Form 2075-7 (8-87)

 $\mathcal{T}^{(k)}(x,y,y) = \frac{1}{2} \mathcal{T}_{k}(x,y) + \frac{1}{2} \mathcal{T}_{k}(x,y)$ 

TYPE OF ACTIVITY (CIRC SUPERFUND—PA SI E NPLD ( NON-SUPERFUND—	S RD I	RA E	R	3398 Carmel Mtw Rd				1. SU 2. GR	SAMPLE DESCRIPTION 6 ER IN BOX A) 4. SOIL RFACE WATER 5. SEDIMENT OUND WATER 6. OIL (SAS) ACHATE 7. WASTE (SAS)	
SITE NAME:  CLARKOIL & RE CITY, STATE:  BLUE IS LAND, I		SITE SF		D: -	SAMPLING DATE: /2/4/87  SHIP				SPIKE	LE VOLUME REQUIRED FOR MATRIX E/DUPLICATE AQUEOUS SAMPLE MEDIUM AND HIGH CONCENTRATION PLES IN PAINT CANS
SAMPLER: (NAME) ROBERT SCHOOL	EDD	<i>y</i>		DATE SHIPPED: CARRIER: FE ® AIRBILL NO: 650741793 >-				SEE REVERSE FOR ADDITIONAL INSTRUCTIONS		
	CRIPTION (S) 5 6 7 (S) - HIGH (SAS)			AS YSIS		SPECIAL HANDLING	© STATION LOCATION			
CLP SAMPLE NUMBER (FROM LABELS)	SAMPLE DESC (FROM BOX 1) 1 2 3 4	CONCENTRATION	VOLATILE	BASE/NEUT /ACID	PESTICIDE /PCB's					
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EP733	1	<u>_</u>	X	X	X			559		
EP743	1	4	X	X	X			574		ा <b>हाँ के</b> क उपके प्रकायन है।
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EPA Form 2075-7 (8-87)

# APPENDIX D SAS Packing Lists

CLP Sample Management Office P.O. Box 818 - Alexandria, Virginia 22313 Phone: 703/557-2490 - FTS/557-2490 SAS Number 3504 E

## SPECIAL ANALYTICAL SERVICE PACKING LIST

Sampling Office:	Sampling Date(s): 12/2/87	Ship To: CENTEC ANALYTICAL SERVICES	For Lab Use Only
Sampling Contact:  ROBERT SCHOEPKE (name)	Date Shipped: 12/2/87	2160 INDUSTRIAL DR. SALEN, VA 24153	Date Samples Rec'd:
(312) 223-0900 (phone)	Site Name/Code:	Attn: Suzan Shepard	Received By:
Sample Numbers  13504 E01  23504 E02  3.	i.e., Analysis, 88J601572 - AF 88J601560 - AP ABOVE TWO LEVEL C FOR TSS + 88J601562 A ABOVE FUR LOW Leve	Ple Description Matrix, Concentration Pl Separator Influent I Separator Return Flow (2) Samples are ONCENTRATION WATERS SULFICES PI Separator Sludge AF Sludge LOCAL Samples are LOANCENTY - METALS  LOANCENTY - METALS	Sample Condition on Receipt at Lab
			For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

Sampling Date(s):

CLP Sample Management Office

Sampling Office:

18. 19. 70.

D.O. Box 818 - Alexandria, Virginia 22313 hone: 703/557-2490 - FTS/557-2490

SAS Number 3504 E

For Lab Use Only

For Lab Use Only

### SPECIAL ANALYTICAL SERVICE PACKING LIST

Ship To:

Sampling Contact:  ROBERT SCHOEPKE (name)  (312) 228-0900 (phone)	Date Shipped:    12/2/87   CENTEC ANALYTICAL   SERVICES     12/2/87   2160 Industrial drive     Site Name/Code:   Attn:   SUSAN SHEPARD   Date Samples Rec'd:   Date Samples Rec'd:     Received By:   CENTEC ANALYTICAL   SUSAN SHEPARD
Sample Numbers  1. 3504E0/ 2. 3504/503 3. 4. 5. 6. 7. 8. 9. 10. 11. 12. 13. 14. 15. 16.	Sample Description i.e., Analysis, Matrix, Concentration Receipt at Lab  88 It01573 API Separator Influent 88 It01500 API Separator Refer Flow  Above (3) Samples are low Cinemporation Receipt at Lab  Cinemporation Receipt at Lab  Above (3) Samples are low Cinemporation on Receipt at Lab  Above (3) Samples are low Cinemporation on Receipt at Lab

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

Sampling Date(s):

12/3/87

CLP Sample Management Office P.O. Box 818 - Alexandria, Virginia 22313 Phone: 703/557-2490 - FTS/557-2490

Sampling Office:

18. 19. 20. SAS Number 3504 E

For Lab Use Only

### SPECIAL ANALYTICAL SERVICE PACKING LIST

Ship To:

CENTER ANALYTICAL SERVICES

Sampling Contact:  ROBERT SCHVEPKE  (name)  (312) 228-0900  (phone)	Date Shipped:  /2/3/8/7  Site Name/Code:	SERVICES 2160 INDUSTRIAL DRIVE SALEM, VA 24153  Attn: SUSAN SHEPARD	Date Samples Rec'd:  Received By:
Sample Numbers  1. 3504E01  2. 3504E02  3. 4. 5. 6. 7. 3504E03  8. 3504E04  9. 10. 11. 12. 13. 14. 15. 16.	i.e., Analysis  88 J601564  88 J601565  Above two  Low Concent  60R 01L dg  755 and  88 J601567  88 J601568  Above two	ple Description , Matrix, Concentration  API Separated TNFEVEN  API Return FLOW  (2) Samples are  diation unters  rease, EP-toxicity,  Sulfides  API Sexuator Surg  DAF SLUDGE  (2) Samples are  diation sludges  exicity	
17.	d-10.		

For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy

Sampling Date(s):

CLP Sample Management Office P.O. Box 818 - Alexandria, Virginia 22313 Phone: 703/557-2490 - FTS/557-2490

Sampling Office:

SAS Number 3504 E

For Lab Use Only

## SPECIAL ANALYTICAL SERVICE PACKING LIST

Ship To:

Sampling Contact:  LOBERT SCHOEPKE (name)  (312) 228-0900 (phone)	12/4/87  Date Shipped: 12/4/87  Site Name/Code:	CENTEC ANALYTICAL SRVCS. 2160 INDUSTRIAL DRIVE SALEM VA, 24153  Attn: Susan Shepard	Date Samples Rec'd: Received By:
Sample Numbers  1. 3504 E 01  2. 3504 E 01  3.	i.e., Analysis <u>985601573 -</u> <u>885601859</u>	ple Description , Matrix, Concentration  API RETUCH FLOW  API SEMERATOR INFWENT	Sample Condition on Receipt at Lab
4. 5. 6. 7.	WATER SAME	TWO LOW CONCENTRATION PLES ARE TO BE FOR DIL & GREASE, SULFIDES, A TSS.	
9. <u>3504E03</u> 10. <u>3504E04</u> 11	88 360   576		
13	SLUDGE SAMF	TWO LOW CONCENTRATION PLES ARE TO RE OR EP-TOX.	
18. 19.			For Lab Use Only

White - SMO Copy, Yellow - Region Copy, Pink - Lab Copy for return to SMO, Gold - Lab Copy